JVC

SERVICE MANUAL

STEREO VIDEO CASSETTE RECORDER VHS

HR-D455E/EB/EG

SPECIFICATIONS

General

Power requirement		: 220 V~, 50/60 Hz
Power consumption		: 35 watts
Temperature		: Operating: 5°C to 40°C Storage: -20°C to 60°C
Operating position		: Horizontal only
Weight		: 8.7 kg
Dimensions		: 435(W) x 105(H) x 375(D) mm

Tape deck section

Format		: VHS PAL standard
Video signal system		: PAL colour and CCIR monochrome signals, 625 lines
Video recording system		: Luminance: FM recording Colour: Phase shift & converted subcarrier direct recording
Scanning system		: Rotary, slant azimuth, two-head helical scan system with two pairs of video heads, one pair exclusively for the SP mode and one pair for the LP mode.
Tape width		: 12.65 mm
Tape speed	(SP)	: 23.39 mm/sec. ±0.5 %
	(LP)	: 11.70 mm/sec. ±0.5 %
Maximum recording time	(SP)	: 240 min. with E-240 video cassette
	(LP)	: 480 min. with E-240 video cassette

Video

Input	: 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output	: 1.0 Vp-p, 75 ohms, unbalanced
S/N ratio	: 43 dB (Rohde & Schwarz noise meter) with PICTURE SHARPNESS control at centre position
Horizontal resolution	: 250 lines with PICTURE SHARPNESS control at centre position

Audio

No. of audio channels	: 2 channels
Input	: Mic : -67 dBs, high impedance, unbalanced AUDIO connector (5-pin DIN): -20dBs, 50 k-ohms, unbalanced AUDIO/VIDEO socket (21-pin, *EB/EG models): -8 dBs, 50 k-ohms, unbalanced
Output level	: AUDIO connector (5-pin DIN): -6 dBs, high impedance load AUDIO/VIDEO socket (21-pin, *EB/EG models): 0 dBs, high impedance load
Output impedance	: Less than 1 k-ohm, unbalanced
Signal-to-noise ratio	: More than 46 dB (Noise reduction on)
Frequency range	: 70 Hz to 10,000 Hz

TV tuner/RF section

Channel storage capacity	: 32 channels
Aerial input	: VHF band I, 47 – 118 MHz (E model: channels 2 – 4) VHF band III, 118 – 300 MHz (E model: channels 5 – 12) UHF band IV/V, 470 – 862 MHz (E model: channels 21 – 69)
Aerail output	: UHF channels 32 – 40 (adjustable)

Digital clock/timer

Clock display	: 24-hour fluorescent digital display with day indication
Reference frequency	: Quartz controlled
Start time setting	: Within 2 weeks
Programming capacity	: 8 programmes
Accessories	: Aerial cable, Video cassette, Infrared remote control unit, "R6" battery x 2

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▩) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors

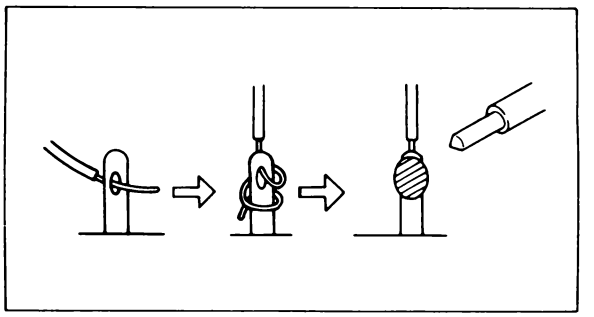

Fig. 1

5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

7. Check that replaced wires do not contact sharp edged or pointed parts.

8. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.

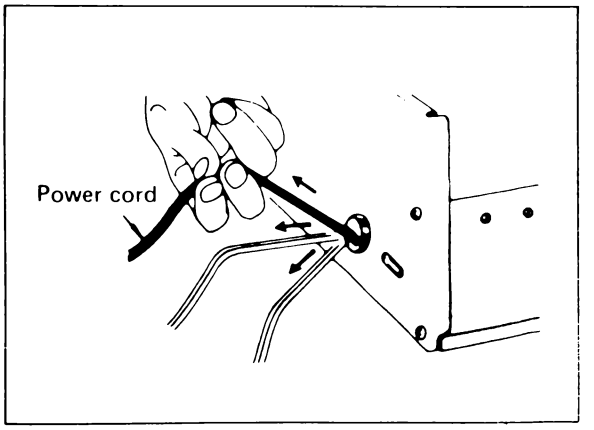

Fig. 2

9. Also check areas surrounding repaired locations.

10. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the parts specified. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

11. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1. Connector part number : E03830-001
2. Required tool : Connector crimping tool of the proper type which will not damage insulated parts.
3. Replacement procedure

    1) Remove the old connector by cutting the wires at a point close to the connector.
    Important : Do not reuse a connector (discard it).
    2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
    3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
    4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.
    5) Check the four points noted in Fig. 7.

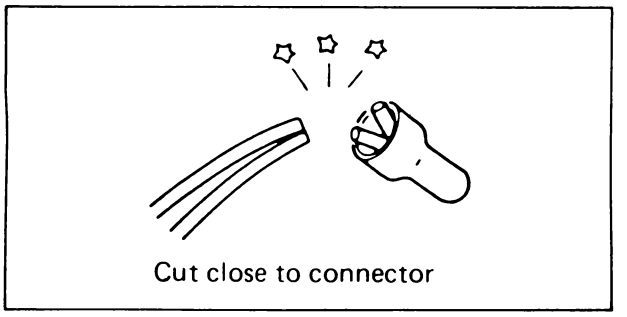

Fig. 3

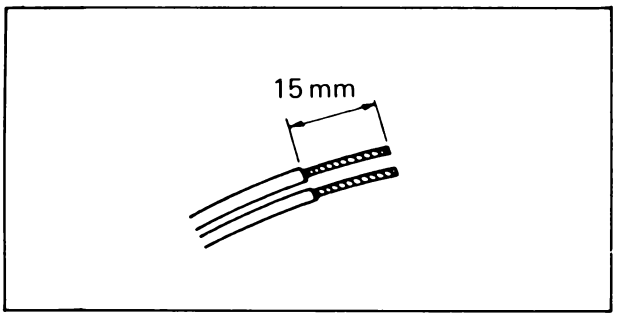

Fig. 4

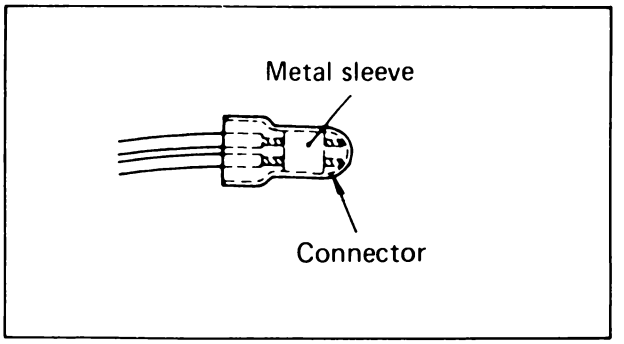

Fig. 5

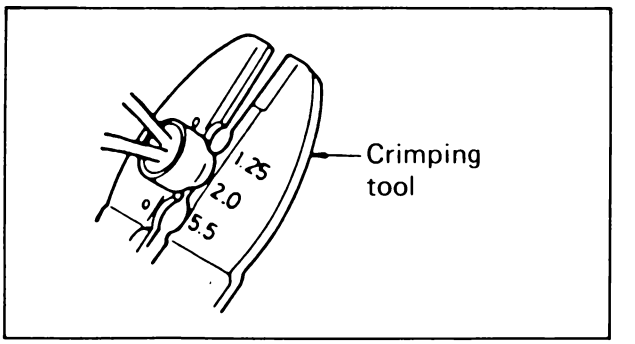

Fig. 6

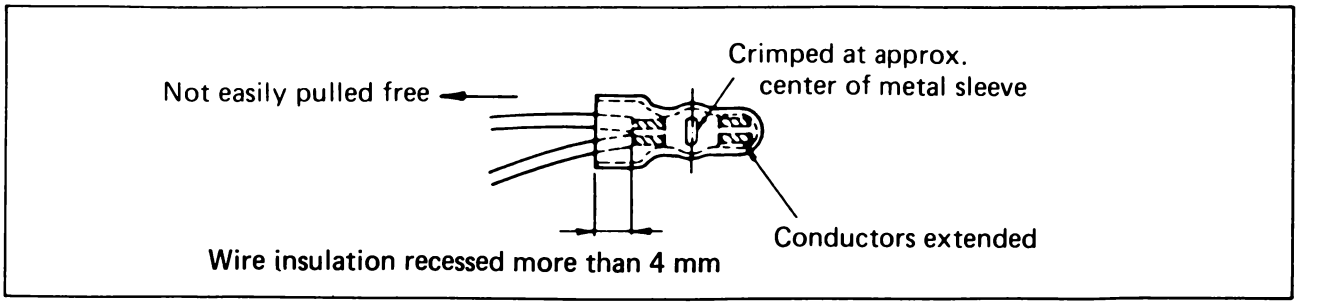
Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) See table below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d),(d') between soldered terminals, and between terminals and surrounding metallic parts. See table below.

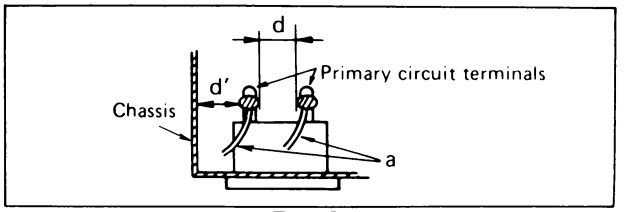

Fig. 8

Table 1: Ratings for selected areas

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance(d),(d')
100 V	Japan	≧ 1 MΩ/500 V DC	1 kV 1 minute	≧ 3 mm
110 to 130 V	USA & Canada	– – –	900 V 1 minute	≧ 3.2 mm
* 110 to 130 V 200 to 240 V	Europe Australia	≧ 10 MΩ/500 V DC	4 kV 1 minute	≧ 6 mm (d) ≧ 8 mm (d') (a: Power cord)

* Class Π model only.
Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

4. **Leakage current test**
   Confirm specified or lower leakage current between B(earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

   Measuring Method: (Power ON)
   Insert load Z between B(earth ground,power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

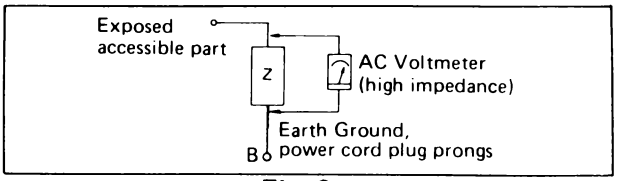

Fig. 9

Table 2: Leakage current ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (B) to:
100 V	Japan	1 kΩ	i ≦ 1m A rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5m A rms	Exposed accessible parts
110 to 130 V 200 to 240 V	Europe Australia	2 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Other terminals

Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

INSTRUCTIONS:
STEREO VIDEO
CASSETTE RECORDER

For reference, the text of the Instruction booklet for this model is reproduced in the following pages.

Numbering of the pages also corresponds with that of the booklet.

The Instructions shown pertain specifically to the Model HR-D455EB. For detailed descriptions, be sure to consult the Instruction booklets of the other models.

Main differing points with respect to other models in this series (with suffixes E and EG) are also included.

The following table lists the principal differing points among the models (suffixes E, EB and EG) in this series.

Item \ Model		E	EB	EG
AUDIO-VIDEO connector		AUDIO-VIDEO input/output DIN socket	AUDIO/VIDEO socket (21 pin Peri connector)	←
	Audio input level	−20 dBs	−8 dBs	←
	Audio output level	0 dBs	←	←
AUDIO REC SELECT switch		No	Yes	Yes
STEREO indicator		No	Yes	Yes
BILINGUAL indicator		No	Yes	Yes
TV-tuner	Wide-band sound multiplex	No	Yes	Yes
	VHF band "I"	channels 2 – 4	*1) 47 – 118 MHz	*2) ←
	VHF band "III"	channels 5 – 12	*3) 118 – 300 MHz	*3) ←

NOTES:

← :Same as model at left

*1) VHF channels E2−E4, S1−S3, M1−M2 in Belgium.
VHF channels E2−E4, X, Y, Z, S1−S2 in Switzerland.

*2) VHF channels E2−E4, S21−S23, S1−S2 in West Germany.

*3) VHF channels M3−M10, E5−E12, U1−U10 in Belgium.
VHF channels S3−S10, E5−E12, S11−S20 in Switzerland/West Germany.

Thank you for purchasing the JVC HR-D455EB Stereo Video Cassette Recorder. This unit is based on the VHS video format developed by JVC for full home video entertainment, providing high-quality recording and playback capabilities.
It includes a number of state-of-the-art features. Especially with its stereophonic facility, this recorder lets you enjoy stereophonic or bilingual tapes. Now you can record any TV programme for viewing at your convenience or make your own programme using a video camera.
Before using the HR-D455EB, read this instruction booklet carefully for obtaining the best results from your new unit.

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WARNING

1. This set is for exclusive use with the PAL colour system (system B and G).
2. SECAM (system B and G) colour programmes might be recorded in certain areas but there is no interchangeability of these recorded cassette tapes with other PAL-VHS recorders or SECAM-VHS recorders.
3. Please use the exclusive SECAM-VHS recorder in SECAM broadcasting areas.
4. Please use only PAL prerecorded cassette tapes or PAL signals which have been recorded with the PAL-VHS system.
5. For camera recording, connect a video camera built to the PAL standard.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

CAUTION

Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

MAINS POWER SWITCH

The mains switch is located on the rear connector panel. Setting this switch to OFF removes all applied power from the set including the timer clock. Switching on or off the recorder section is performed with the secondary power switch, labelled OPERATE, on the front panel.

IMPORTANT: It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

NOTE: The rating plate and the safety caution are on the rear of the unit.

CAUTION: When you are not using the HR-D455EB for a long period of time, it is recommended that you disconnect the power cord from AC outlet.

VHS
PAL

Only cassettes marked VHS can be used with this video cassette recorder.

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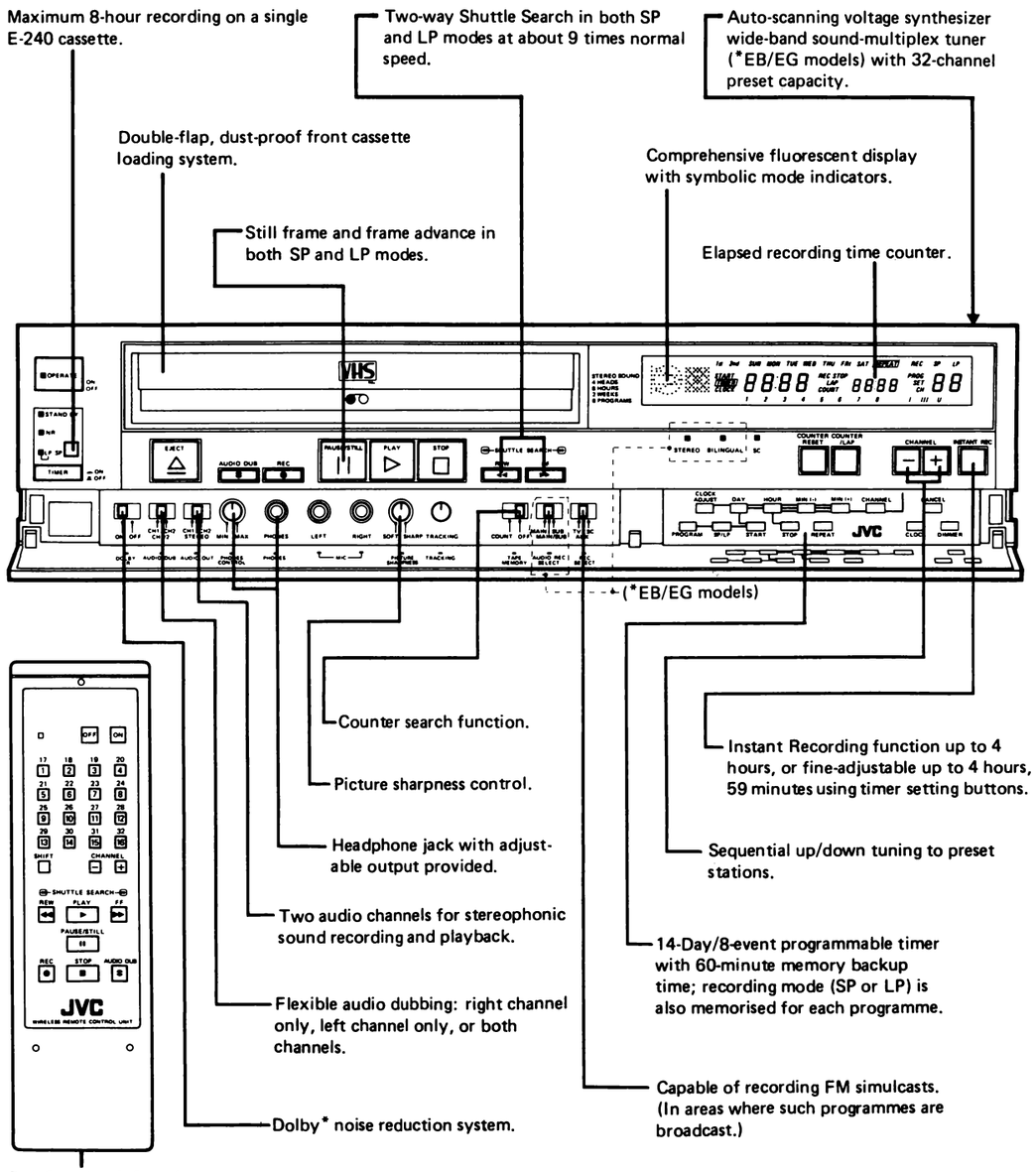
FEATURES


Maximum 8-hour recording on a single E-240 cassette.
Two-way Shuttle Search in both SP and LP modes at about 9 times normal speed.
Auto-scanning voltage synthesizer wide-band sound-multiplex tuner (*EB/EG models) with 32-channel preset capacity.
Double-flap, dust-proof front cassette loading system.
Comprehensive fluorescent display with symbolic mode indicators.
Still frame and frame advance in both SP and LP modes.
Elapsed recording time counter.
(*EB/EG models)
Counter search function.
Picture sharpness control.
Instant Recording function up to 4 hours, or fine-adjustable up to 4 hours, 59 minutes using timer setting buttons.
Headphone jack with adjustable output provided.
Sequential up/down tuning to preset stations.
Two audio channels for stereophonic sound recording and playback.
14-Day/8-event programmable timer with 60-minute memory backup time; recording mode (SP or LP) is also memorised for each programme.
Flexible audio dubbing: right channel only, left channel only, or both channels.
Capable of recording FM simulcasts. (In areas where such programmes are broadcast.)
Dolby* noise reduction system.
Full-function infrared remote control.

- Slim, low-profile design – 105 mm in height.
- 4-Head system for picture clarity even in the long playing (LP) mode.
- Auto rewind at tape end.
- 21-pin Peri connector for A/V connection to a stereo television (*EB/EG models).
- Full-logic tape transport control system.
- Direct-drive head drum motor for higher stability and reliability.
- Dimmer control provided on the timer control panel.

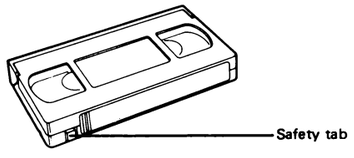
PRECAUTIONS

Handling and storage

- Avoid using the recorder under the following conditions:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields,
  - places subject to vibrations, and
  - poorly ventilated places.
- Be careful of moisture condensation.
  Avoid using the recorder immediately after moving from a cold place to a warm place or soon after heating a room which was cold. The water vapor in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.
- Handle the recorder carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill and cause trouble on the top cover of the recorder.
  - Use in horizontal (flat) position only.
- In case of transportation,
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

Video cassettes

- This recorder employs VHS-type cassettes only.
  E-240 for 4 or 8 hours, E-180 for 3 or 6 hours, E-120 for 2 or 4 hours, E-60 for 1 or 2 hours and E-30 for 30 minutes or 1 hour of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the hole.



- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

CAUTION:
Do not bring cassettes near the magnets used for closing the sub-control panel cover.

Moisture condensation

- If you pour a cold liquid into a glass, water vapor in the air will condense on the surface of the glass. This is called moisture condensation.
- Moisture condensation on the head drum, one of the most crucial parts of the video recorder, will cause damage to the tape.
- Moisture in the air will condense on the recorder when you move it from a cold place to a warm place, after heating a cold room or under extremely humid conditions.
- This recorder is equipped with a moisture condensation prevention circuit which automatically heats the head drum according to the ambient temperature. This circuit operates only when the unit is plugged into an AC outlet, the rear panel MAINS POWER switch is set to ON and the front panel OPERATE button is in the OFF position.
- The moisture condensation prevention circuit consumes only a slight amount of power. However, if for some reason you are not using the recorder for a long period of time, it is advisable to remove the power cord from the AC outlet or set the rear panel MAINS POWER switch to OFF.
- Since the moisture condensation prevention circuit cannot evaporate existing moisture condensation immediately after the power cord has been plugged into the AC outlet, you must allow for about 2 hours if the recorder is to be used in such areas as would occasion moisture condensation.

Operation

- The cassette can be loaded only when the recorder is powered (with the front panel OPERATE button in the ON position). Do not force the cassette into the slot with the power off.
- When the rear panel MAINS POWER switch is set to ON after it has been set to OFF once, the recorder section cannot be powered even though the front panel OPERATE button has remained in the ON position. In such a case, first press the OPERATE button to OFF and then press it to ON.
- If you wish to operate the recorder locally after you have switched the power off via the remote control unit, first press the OPERATE button to OFF and then press it to ON again.
- As long as the OPERATE button is in the ON position, switching the recorder on or off can be performed via the remote control unit.

Remote control unit

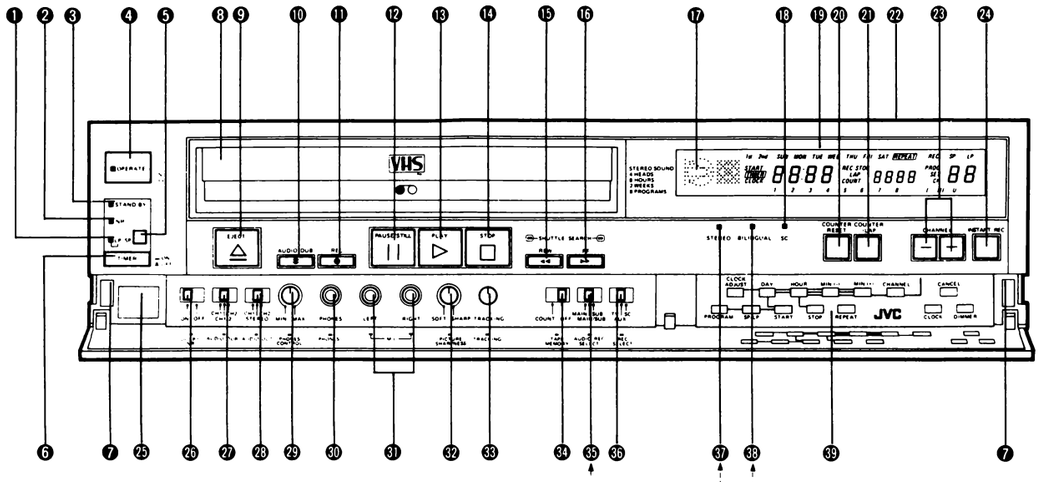
- Avoid violent shocks, especially take care not to drop the unit.
- Take care not to allow liquid to spill into the unit.
- Do not place heavy objects on the unit.
- Avoid leaving the unit in places subject to direct sunlight or extremely high temperatures.

*Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.
Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

CONTROLS, INDICATORS AND CONNECTORS

Keep this page opened so that you can refer to it at any time when you are reading this booklet.

Front panel



❶ LP mode indicator
Lights when the LP/SP button ❺ is in the LP position during recording. In playback, it automatically lights when an LP recording is being played back regardless of the switch setting.

❷ NR indicator
Lights when the DOLBY NR switch ㉖ is set to ON.

❸ STAND BY indicator
This green LED lights when the rear-panel MAINS POWER switch is set to ON and the front-panel OPERATE button is OFF.

❹ OPERATE button
Press to apply power to the recorder. The indicator will light.

❺ LP/SP recording mode select button
Leave the button in its 'out' position when you wish recordings to be made in the SP (Standard Play) mode. When you wish to record longer TV shows or for unattended and prolonged recording of a number of TV shows with a combined time of up to 8 hours, press this button to LP (Long Play).

❻ TIMER button
Press to ON (▬) after you have preset the timer for unattended recording.

❼ Magnets
Exercise care not to bring video cassettes near these magnets.

❽ Cassette loading slot
Insert a VHS video cassette. The door will close and the indicator showing that a cassette is inside will appear.

❾ Cassette EJECT button

❿ AUDIO DUB button
Press this button together with the PLAY button ⓭ for audio dubbing. (See page 28.)

⓫ Record button (REC)
Press together with the PLAY button ⓭ for video and audio recording.

⓬ PAUSE/STILL button
Press to stop the tape temporarily to avoid recording of unwanted material or to view a still picture. The still picture can be advanced in a frame-by-frame manner each time this button is pressed.

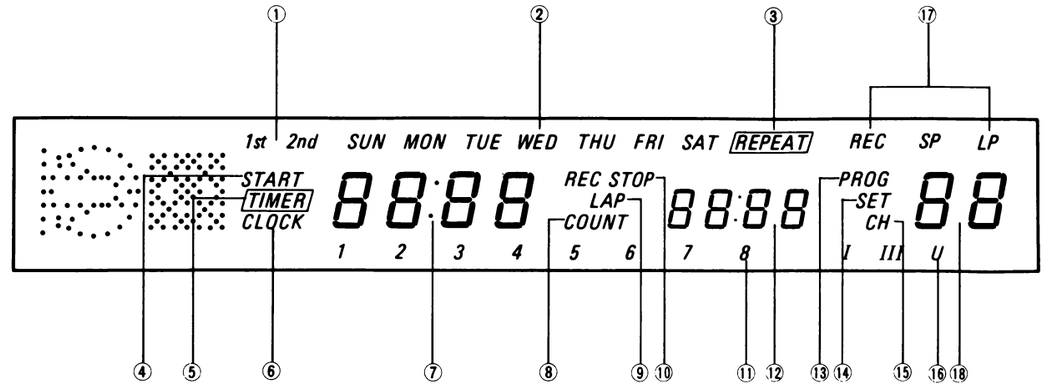
⓭ PLAY button
Press to play back the tape or cancel the Pause/Still mode. Also press this button together with the REC button ⓫ for recording or with AUDIO DUB button ❿ for audio dubbing.

⓮ STOP button
To stop the tape.

⓯ REW/SHUTTLE SEARCH button
To rewind the tape, press this button while in the Stop mode. To view the speeded-up picture in the reverse direction for programme search, hold this button pressed while in the Play mode.

⓰ FF/SHUTTLE SEARCH button
To fast forward the tape, press this button while in the Stop mode. To view the speeded-up picture in the forward direction for programme search, hold this button pressed while in the Play mode.

⓳



⓱ Symbolic mode indicator
Illuminates to give quick, easy visual reference of the operating mode. Combinations of 6 different symbols indicate 10 operating modes:

PLAY:		AUDIO DUB PAUSE:	
STILL:		REWIND:	
RECORD:		FAST FORWARD:	
RECORD PAUSE:		REVERSE SHUTTLE SEARCH:	
AUDIO DUB:		FORWARD SHUTTLE SEARCH:	

⓲ SC (Simulcast) indicator
Lights when the REC SELECT switch ㉟ is set to SC.

⓳ Fluorescent display section

① Week indicator
"1st" or "2nd" illuminates to show the week for making preset recordings. "1st" stands for the period within one week and "2nd" within the second week from setting.

② Day indicator
Illuminates both for continuous day indication and for day presetting for future recordings.

③ REPEAT indicator
Illuminates when the REPEAT button (⑫ of ㊴) is pressed to show that the entered data for timer recording will be retained for serial recordings.

④ START indicator
Flashes for switch-on time setting.

⑤ TIMER indicator
Illuminates when the TIMER button ❻ is pressed to ON (▬) to show that the recorder has been properly preset for timer recording.

⑥ CLOCK indicator
Always illuminates except in the Programme Set mode.

⑦ Clock/Start time display

⑧ COUNT indicator
Illuminates to show that the digits in the display to the right are the counter reading.

⑨ LAP indicator
Illuminates to show that the digits in the display to the right are the reading for the elapsed recording time.

⑩ REC STOP indicator
Flashes or illuminates in the Instant Recording mode. Only STOP flashes for switch-off time setting.

⑪ Programme number indicator
Numerals 1 through 8 illuminate successively each time the PROGRAM button (⑧ of ㊴) is pressed to show which programme is ready for entry.

⑫ Stop time/Elapsed time/Counter display/Sweep indicator

⑬ PROG indicator
Flashes to show that the channel is ready to be entered for timer recording.

⑭ SET indicator
Illuminates when the CH SET button (① of ㉒) in the top-panel pre-tuning section is pressed for pre-tuning and flashes during sweep scanning.

⑮ CH indicator
Illuminates to show that the displayed channel is currently being received by the built-in tuner.

⑯ I, III, U indicators
Flashes when the corresponding AUTO tuning button (② of ㉒) is pressed, showing that sweep scanning of that particular frequency band is being performed. Also functions during manual tuning using the MANUAL "+" or "–" button (⑤ of ㉒).

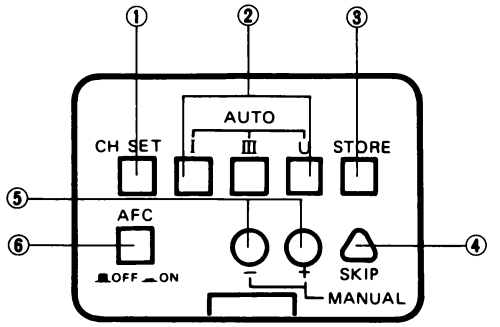
⑰ REC SP and LP indicators
When the SP mode is selected with the recording time SP/LP button (⑨ of ㊴), REC SP lights: when LP is selected, REC LP lights.

⑱ Channel display
Numerals 1 through 32 are successively displayed to show which channel is selected for recording, timer setting or for pre-tuning.

⑳ **COUNTER RESET button**
Press to reset the tape counter reading to "0000" and lap time reading to "0:00".

㉑ **COUNTER/LAP button**
Press to switch the middle 4-digit display from tape counter to lap time display, or vice versa. (See page 20.)

㉒ **Built-in tuner pre-tuning compartment**
Open the compartment cover on top of the unit.



① **CH SET button**
Press this button for pre-tuning the built-in tuner to TV stations in your area. (See pages 15 and 16.)

② **AUTO tuning buttons (AUTO I, III, U)**
Press one of the buttons corresponding to the band in which you want to perform tuning. Automatic sweep tuning is initiated by pressing the button and stops automatically when a TV station is captured.

③ **STORE button**
To store the tuned-in station in memory. (See pages 15 and 16.)

④ **SKIP button**
To skip unused channels. (See page 16.)

⑤ **MANUAL tuning buttons (+/-)**
For manual tuning to weaker broadcast signals. (See page 16.)

⑥ **AFC button**
Set to ON to activate the built-in Automatic Frequency Control circuit for fine picture tuning. Normally leave it in the ON position. (See pages 15 and 16.)

㉓ **CHANNEL +/- buttons**
Press to tune to preset stations; the "+" button for scanning in the direction of increasing channel numbers and the "-" button in the direction of decreasing channel numbers. The selected channel will appear in the channel display.

㉔ **INSTANT REC button**
Use this button to start recording instantly and stop automatically after a predetermined time. (See page 26.)

㉕ **Infrared beam receiving window**

㉖ **Noise reduction switch (DOLBY NR)**
Set to ON to activate the built-in Dolby* NR circuit to minimise tape hiss. Recordings made with this switch set to ON should be played back with the switch set to ON.

㉗ **AUDIO DUB channel select switch**
Selects the audio channel(s) to be dubbed.
CH1: the left channel sound is replaced with a new recording while the right channel sound remains as original.
CH1/2: both the left and right channel sounds are replaced with new recordings.
CH2: the right channel sound is replaced with a new recording while the left channel sound remains as original.

㉘ **AUDIO OUT switch**
Selects the audio channel(s) to be listened to.
When listening to bilingual or stereo programmes, select the desired audio channel.
CH1: to listen to the sound on the left channel track (main soundtrack of a bilingual programme).
STEREO: to listen to the sound from stereo tapes. (The audio output from the ANTENNA OUT terminal is monaural. Therefore, if only the ANTENNA OUT connection is made, the mixed sound of both channels is heard when this switch is set to STEREO.)
CH2: to listen to the sound on the right channel track (sub soundtrack of a bilingual programme).
For more information about audio tracks, refer to pages 10 through 12.

㉙ **PHONES CONTROL**
Adjusts the level of audio output from the PHONES jack.

㉚ **Headphone jack (PHONES)**
Connect a set of headphones for monitoring or private listening.

㉛ **MIC jacks (LEFT, RIGHT)**
Connect microphones for stereo recordings.
- When a microphone is plugged into the LEFT jack only, the same sound is recorded on both channels.
- When a microphone is plugged into the RIGHT jack only, the sound is recorded on the right channel.
- With a microphone connected to each jack, stereo recordings are possible.

㉜ **PICTURE SHARPNESS control**
Turn this knob clockwise to make the picture sharper. Turn counterclockwise to give the picture a softer tone. Effective only for playback pictures. (No effect for recording.)

㉝ **TRACKING control**
Use this control to eliminate noise bars, if observed during playback.

㉞ **TAPE MEMORY switch**
When the switch is set to COUNT, the tape stops automatically at the counter reading of nearly "0000" during fast forward and rewind. Refer to page 20. Normally set this switch to OFF.

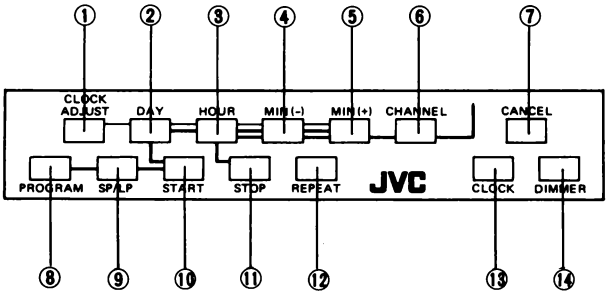
㉟ **AUDIO REC SELECT switch (*EB/EG models)**
For selecting the desired soundtrack when recording bilingual programmes.
MAIN: Main soundtrack (local language) will be recorded onto both channels (CH1/2).
MAIN/SUB: Main soundtrack (local language) will be recorded on the left channel (CH1) and the sub soundtrack (foreign language) will be recorded on the right channel (CH2).
SUB: Sub soundtrack (foreign language) will be recorded on both channels.

㊱ **REC SELECT switch**
For selecting the recording input signal.
TV: To record signals coming from the built-in tuner.
AUX: To record signals coming from a unit connected to the rear panel AUDIO/VIDEO socket.
SC: To record the video signal from the built-in tuner and the audio signal from the rear panel AUDIO connector. When recording FM simulcast TV programmes (if broadcast), use this position.

㊲ **STEREO indicator (*EB/EG models)**
Lights when a stereophonic programme is being received.

㊳ **BILINGUAL indicator (*EB/EG models)**
Lights when a bilingual programme is being received.

㊴ **Clock/timer setting section**



① **CLOCK ADJUST button**
Hold this button pressed for clock setting.

② **DAY button**
Press until a desired day indication appears on the display for clock and timer settings.

③ **HOUR button**
Press to obtain a desired hour indication for clock and timer settings. Can also be used for fine adjustment of time for instant recording.

④ **MIN(-) button**
Press to decrease the minute indication for clock and timer settings. Can also be used for fine adjustment of time for instant recording.

⑤ **MIN(+) button**
Press to increase the minute indication for clock and timer settings. Can also be used for fine adjustment of time for instant recording.

⑥ **CHANNEL button**
Press this button and then use the CHANNEL buttons ㉓ to obtain a desired channel indication on the display in the Programme Set mode.

⑦ **CANCEL button**
Press this button to cancel or "clear" the preset data.

⑧ **PROGRAM button**
Press this button when you want to preset the timer for unattended recording. The entire display will change to the Programme Set mode, with numeral 1 illuminated at the bottom of the display. This shows that programme memory No. 1 is ready to accept entries. To change the programme number, press this button until the number of the programme memory you want to use illuminates.

⑨ **SP/LP button**
The recording mode can be programmed independently for each preset programme for timer recording.
SP: 4 hours with an E-240 cassette.
LP: 8 hours with an E-240 cassette.

⑩ **START button**
Press for setting the day and switch-on time for automatic timer recording.

⑪ **STOP button**
Press for setting the switch-off time for automatic timer recording.

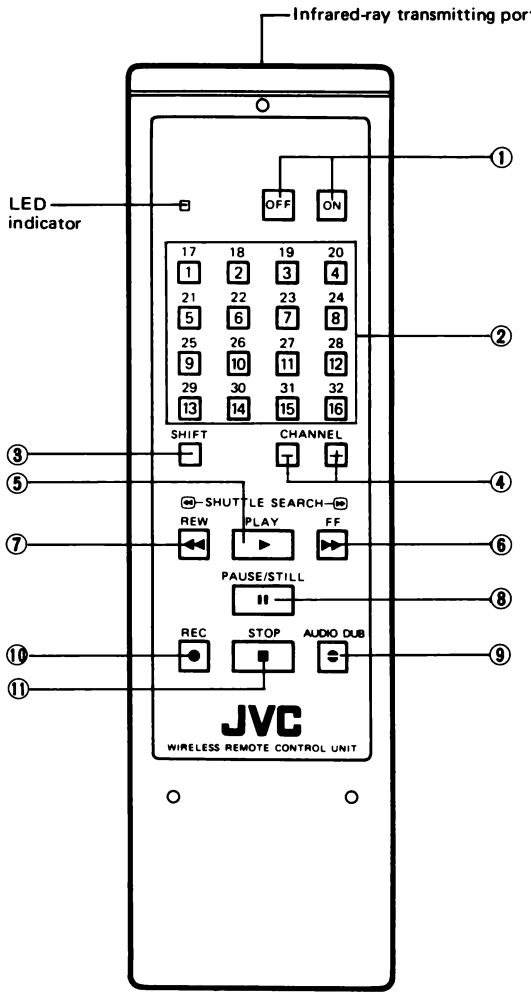
⑫ **REPEAT button**
After you have entered all data for each programme for unattended recording, if you wish the entered data to be kept for serial recording, press this button.

⑬ **CLOCK button**
Press this button to change the display from the Programme Set mode to the Clock mode.

⑭ **DIMMER button**
The brightness of the display can be subdued by pressing this button.

Infrared remote control unit

The infrared remote control unit gives you full operation control from your viewing position. The maximum operating distance is about 8 m.



① Power ON/OFF buttons
To switch power on or off for the recorder.

② Channel number buttons
These buttons are used to call up the desired TV programme channel. (On the recorder the CHANNEL +/- buttons ㉓ perform this same function.)
To call up channel 1, press the "1" button. For channel 2, press the "2" button. And so on. To call up channels from 17 to 32, first press the button under the corresponding number and then press the SHIFT button ③.
The channel number will be displayed on the channel display section of the recorder's fluorescent display.

③ SHIFT button
If you want to call up a channel between 17 and 32, first press the corresponding channel number button (shared with for channels between 1 and 16) and then press this button. By pressing this button, the selected channel is shifted by 16 channels.

④ CHANNEL select buttons (+/-)
Use these buttons for sequential channel selection.

⑤ PLAY button

⑥ FF/SHUTTLE SEARCH button

⑦ REW/SHUTTLE SEARCH button

⑧ PAUSE/STILL button

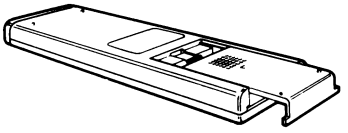
⑨ AUDIO DUB button

⑩ Record button (REC)

⑪ STOP button

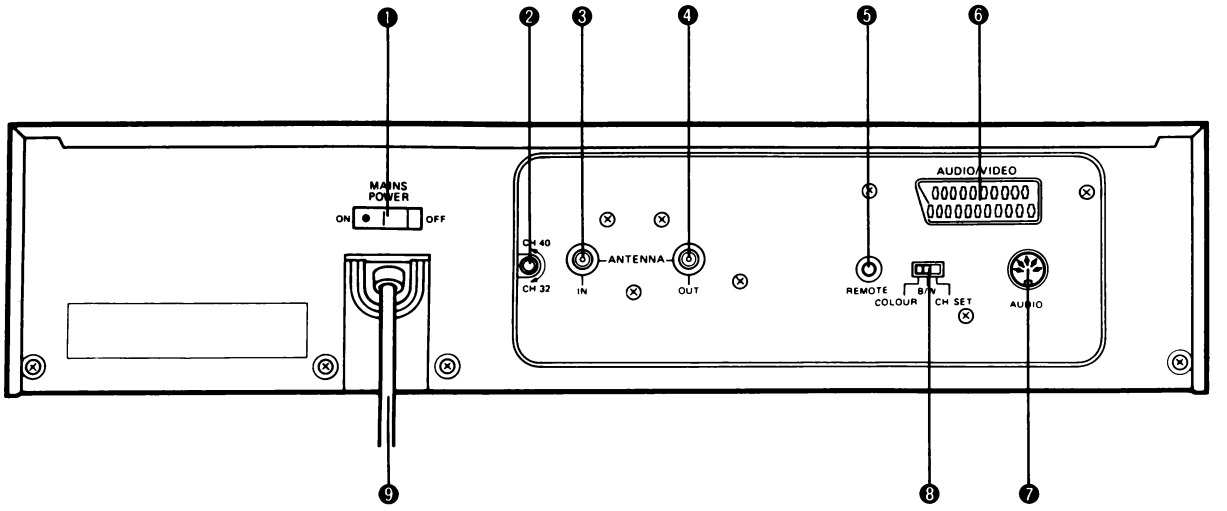
Installing the batteries

1. Slide the battery compartment cover on the rear of the unit in the direction of the arrow (▶).



2. Insert 2 "R6"-size batteries (provided) in the correct directions into the battery compartment.
3. Replace the cover.

Rear panel (*EB/EG models)



❶ MAINS POWER switch
Setting this switch to ON applies mains power to the set and the front panel STAND BY indicator lights. To switch off the set completely, set the MAINS POWER switch to OFF. This switches off the timer/clock circuit and cancels all the preset programming data after the memory backup time (about 60 minutes) has elapsed. This also switches off the built-in aerial circuit so that the TV receiver connected to the recorder will not be able to receive off-the-air TV programmes for good viewing condition. Normally set this MAINS POWER switch to ON.

❷ RF converter frequency adjustment screw
See page 14.

❸ Aerial input connector (ANTENNA IN)
Connect an aerial to this connector.

❹ RF output connector (ANTENNA OUT)
Connect to the aerial connector of a TV receiver through the aerial cable (provided).

❺ REMOTE terminal
When using a JVC video camera, connect the remote control cable of the camera adapter to this terminal for the purpose of controlling the starting and stopping of the tape with the camera's start/stop switch.

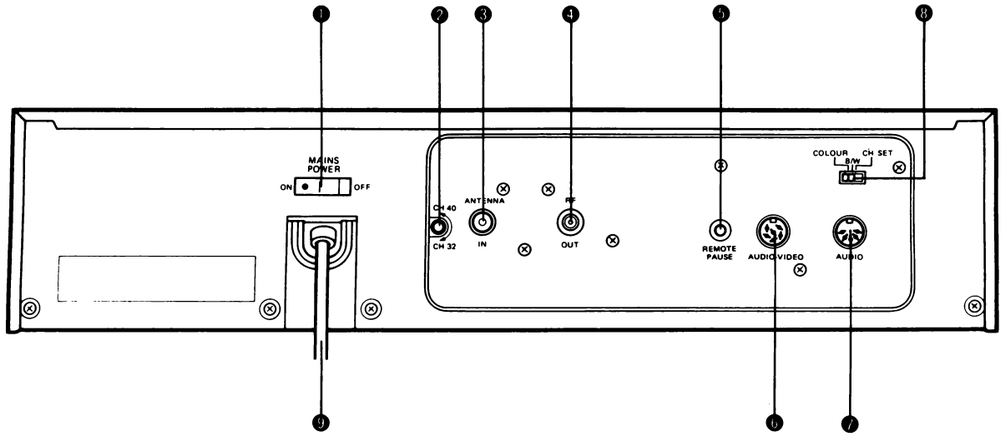
❻ AUDIO/VIDEO socket
A 21-pin standardised audio/video input/output socket for the connection to a stereo TV equipped with the same type of socket.

❼ AUDIO input/output DIN socket
Connect a tape recorder or other audio sources or connect the audio output of other video sources for recording. Also, audio signals being recorded or played back are available from the output terminals of this DIN socket.

❽ Video mode select switch
This applies to both recording and playback.
COLOUR: Set to this position when the input or playback video signal is in colour.
B/W: Set to this position when the input or playback video signal is monochrome.
CH SET: Set to this position when tuning your TV receiver for the "Video Channel".

❾ AC power cord

Rear panel (*E model)



❶ MAINS POWER switch
Setting this switch to ON applies mains power to the set and the front panel STAND BY indicator lights. To switch off the set completely, set the MAINS POWER switch to OFF. This switches off the timer/clock circuit and cancels all the preset programming data after the memory backup time (about 60 minutes) has elapsed. This also switches off the built-in aerial circuit so that the TV receiver connected to the recorder will not be able to receive off-the-air TV programmes for good viewing condition. Normally set this MAINS POWER switch to ON.

❷ RF converter frequency adjustment screw
See page 14.

❸ Aerial input connector (ANTENNA IN)
Connect an aerial to this connector.

❹ RF output connector (RF OUT)
Connect to the aerial connector of a TV receiver through the aerial cable (provided).

❺ REMOTE PAUSE terminal
When using a JVC video camera, connect the remote control cable of the camera adapter to this terminal for the purpose of controlling the starting and stopping of the tape with the camera's start/stop switch.

❻ AUDIO-VIDEO input/output DIN socket
Connect to the AUDIO-VIDEO input/output DIN socket of a stereophonic television set* for recording and playback. This socket can also be used to connect another video recorder to the HR-D455E for editing, etc.
*This type of television set is available only in a country where multiplex sound TV broadcasting is in service.

❼ AUDIO input/output DIN socket
Connect a tape recorder or other audio sources or connect the audio output of other video sources for recording. Also, audio signals being recorded or played back are available from the output terminals of this DIN socket.

❽ Video mode select switch
This applies to both recording and playback.
COLOUR: Set to this position when the input or playback video signal is in colour.
B/W: Set to this position when the input or playback video signal is monochrome.
CH SET: Set to this position when tuning your TV receiver for the "Video Channel".

❾ AC power cord

TO MAKE THE MOST OF THIS RECORDER'S STEREOPHONIC FACILITY

In certain countries, stereo, bilingual or FM simulcast programmes are being broadcast with increasing frequency. This recorder lets you record these programmes while viewing them, while viewing another or even when you are not at home.

Recording and playback are flexible, depending on the connectors used or the various switch settings.
The following chart suggests the possibilities of 2-channel recording and playback.

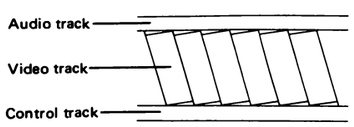
Possibilities of sound recording and playback depending on the connectors used

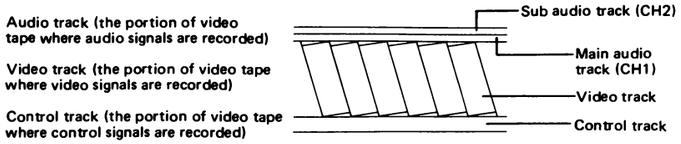
Connector	Input	Output
ANTENNA IN[1)]	●TV recording: Stereo, bilingual (*EB/EG models) and monaural (*E model) programmes can be recorded.	–
AUDIO/VIDEO[2)]	●TV recording: Stereo or bilingual programmes can be recorded only from a stereo TV set.	●Playback: Stereo from stereo tapes.
ANTENNA OUT[3)]	–	●Playback: Monaural. ●Direct output (aerial signal): stereo, bilingual or monaural depending on the broadcast signal.
AUDIO[4)]	●Recording: The audio portion of FM simulcast programmes can be recorded.	●Playback: Stereo from stereo tapes.
PHONES	–	●Playback: Stereo from stereo tapes.
MIC (LEFT, RIGHT)	●Audio dubbing ●Mixed recording	–

1) When the REC SELECT switch ● is set to TV, the signal entering the ANTENNA IN terminal is fed to the recorder's built-in stereo tuner and the signal selected with the AUDIO REC SELECT switch ● (*EB/EG models) is recorded on the tape.
2) The signal supplied to the HR-D455EB's AUDIO/VIDEO socket from the TV set is recorded only when the REC SELECT switch ● is set to AUX. Soundtrack selection is possible with the AUDIO REC SELECT switch ● (*EB/EG models).
3) When the recorder is not used, the aerial signal is supplied from the recorder's ANTENNA OUT connector to your TV set to allow regular TV viewing; stereo, bilingual or monaural programmes are all received in the form they are broadcast. However, when a video tape is played back through the ANTENNA OUT connector (with the TV's channel selector set to UHF channel 36), the audio is reproduced always as monaural; with stereo tapes both channels are mixed and with bilingual tapes the soundtrack selected with the AUDIO OUT switch ㉘ is reproduced.
Therefore, for stereo playback, connect a stereo system to the AUDIO DIN socket, or use a stereo TV set. When a stereo TV set is used for stereophonic playback, you must use the video mode specified on the TV set, instead of the UHF channel 36.
4) When the REC SELECT switch ㉟ is set to SC, the video signal from the built-in tuner and the audio signal from the AUDIO DIN socket are recorded simultaneously. This position should be used when you record FM simulcast television programmes. (Connect an FM tuner to the AUDIO DIN socket.)

Tape pattern of stereo recordings (*EB/EG models)

- Tape pattern recorded with conventional video recorders.



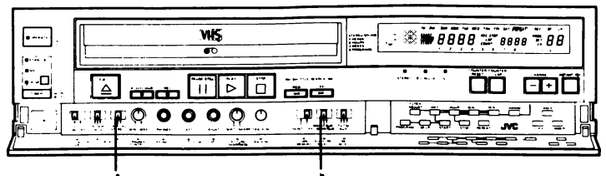

Audio track (the portion of video tape where audio signals are recorded)
Video track (the portion of video tape where video signals are recorded)
Control track (the portion of video tape where control signals are recorded)

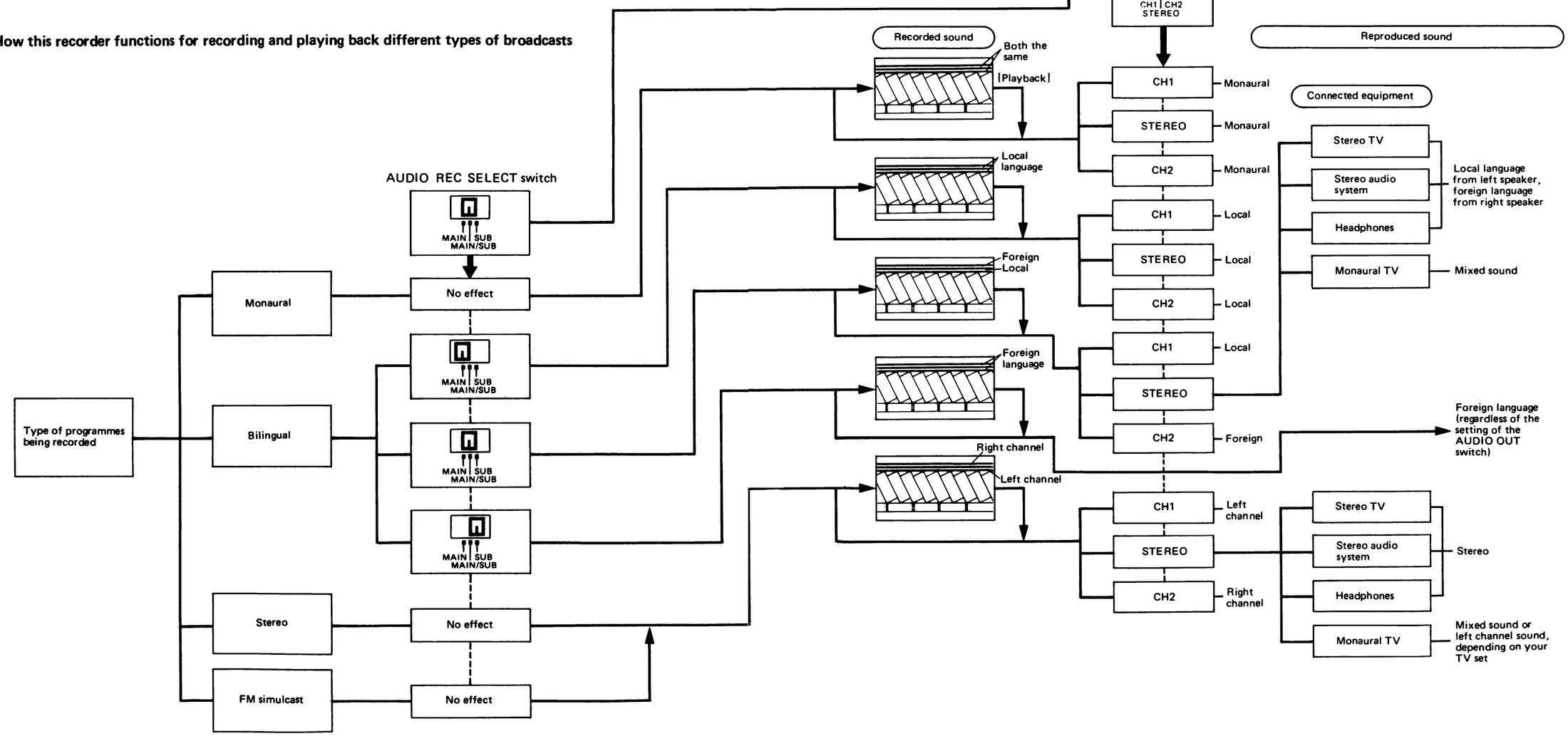
A single audio circuit is provided so that the audio signal is recorded on a single audio track.

- Tape pattern recorded with this recorder.

Because two audio circuits are built in (one for the main or left channel and the other for the sub or right channel), audio signals are recorded onto either one of the channels or both depending on the type of audio source and connection.

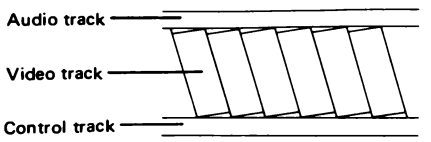
How this recorder functions for recording and playing back different types of broadcasts





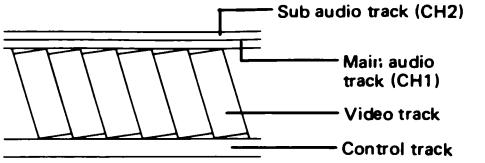
Tape pattern of stereo recordings (*E model)

- Tape pattern recorded with conventional video recorders.


Audio track
Video track
Control track
Audio track (the portion of video tape where audio signals are recorded)
Video track (the portion of video tape where video signals are recorded)
Control track (the portion of video tape where control signals are recorded)

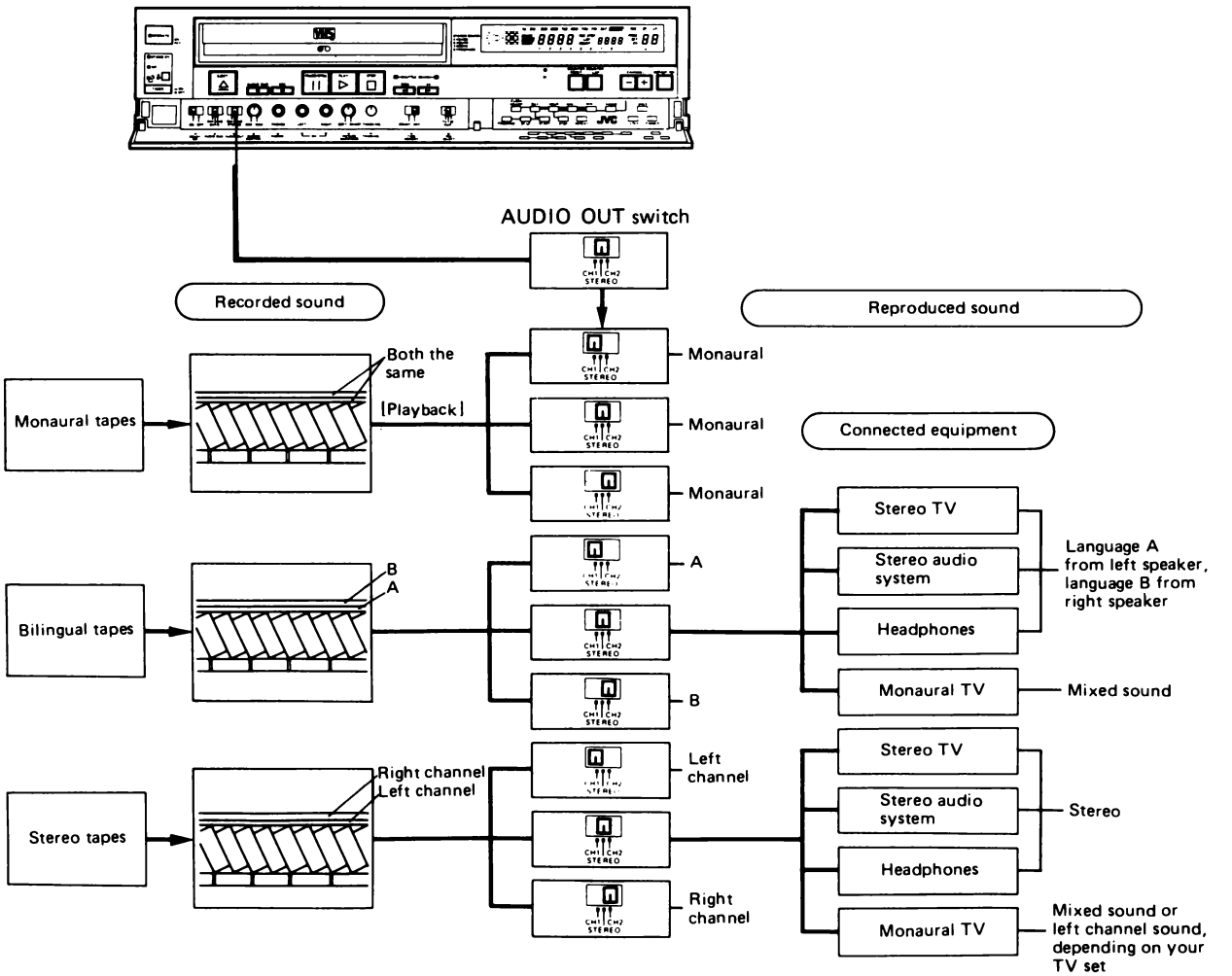
A single audio circuit is provided so that the audio signal is recorded on a single audio track.

- Tape pattern recorded with this recorder.

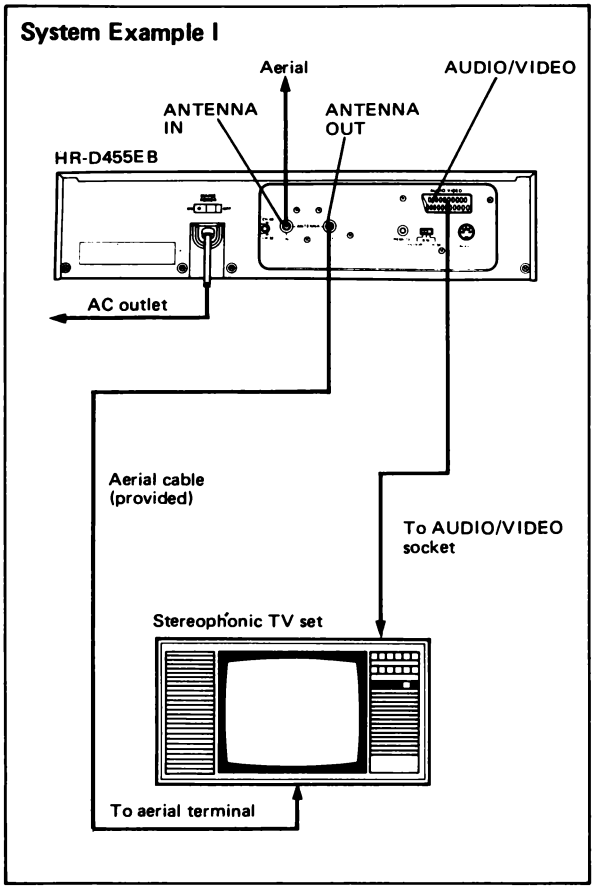


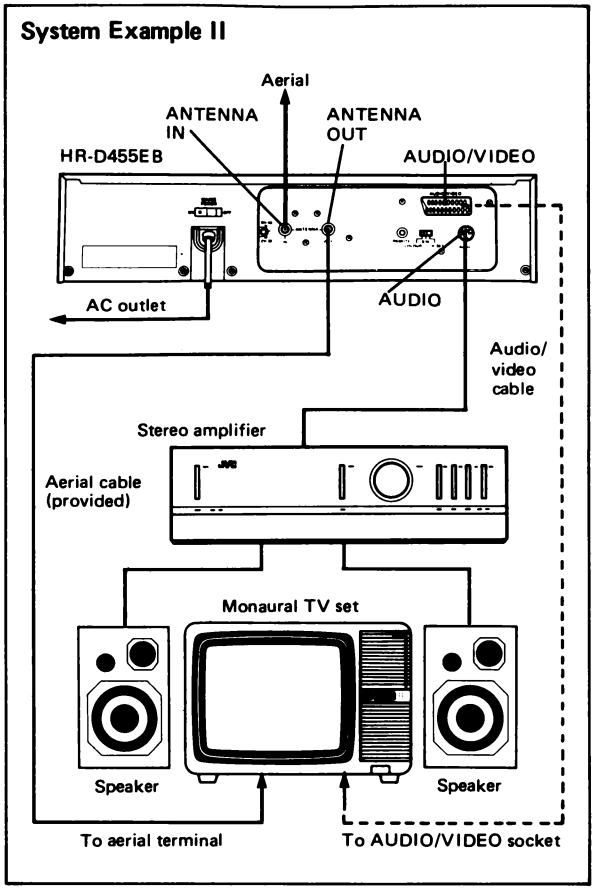
Because two audio circuits are built in (one for the main or left channel and the other for the sub or right channel), audio signals are recorded onto either one of the channels or both depending on the type of audio source and connection.

How to use the AUDIO OUT switch



CONNECTIONS (*EB/EG models)





For customers who own a stereophonic television set equipped with a standardised audio/video socket

Procedure

1. Remove the aerial cable from your TV set and reconnect it to the recorder's ANTENNA IN terminal.
2. Connect the recorder's ANTENNA OUT terminal to the aerial input terminal of your TV set, using the aerial cable provided.
3. Connect the recorder's 21-pin (*EB/EG models) AUDIO/ VIDEO socket to your TV's AUDIO/VIDEO socket. In the case, use the video mode specified on your TV, instead of UHF channel 36.

Notes:

- Stereophonic reproduction is possible only when a connection is made between the AUDIO/VIDEO socket of the recorder to the AUDIO/VIDEO socket of your stereo TV set.
- For information on the TV's socket, refer to the instruction manual of your TV set.

For customers who own a monaural TV set

Procedure

1. Remove the aerial cable from your TV receiver and reconnect it to the recorders as illustrated.
2. Connect the recorder to the TV receiver using the aerial cable provided.
3. Connect the AUDIO input/output DIN socket of the recorder to your stereo system as illustrated.
4. If your TV set is provided with an A/V socket, you can connect it to the recorder's AUDIO/VIDEO socket for playback with better picture quality.

Notes:

- If stereo or bilingual TV broadcasts are receivable in your area, this recorder can record them independently of the TV set and play them back through the connected audio system (*EB/EG models).
- When listening to sound from the connected stereo system, turn down completely the sound volume of the TV receiver.
- Listening to stereophonic sound is also possible using stereo headphones connected to the front panel PHONES jack ㉚

CAUTION

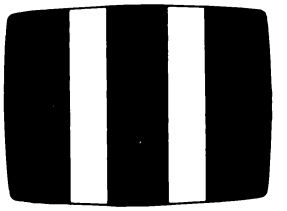
Even when you are not using the recorder, the rear panel MAINS POWER switch should be set to ON in order to be able to view TV broadcast programmes with the illustrated connections.

VIDEO CHANNEL SETTING

ATTENTION
This adjustment is necessary to pre-tune the built-in tuner (see next page). To view video programmes through the ANTENNA OUT terminal, you must set the TV's channel selector to the output channel of the RF converter. If you are going to view video programmes through the AUDIO/VIDEO socket, use the video mode specified for the television set you own. In this booklet, "YOUR VIDEO CHANNEL", used in connection with playback, refers either to the RF output channel adjusted by following the information below or to the specified video mode.

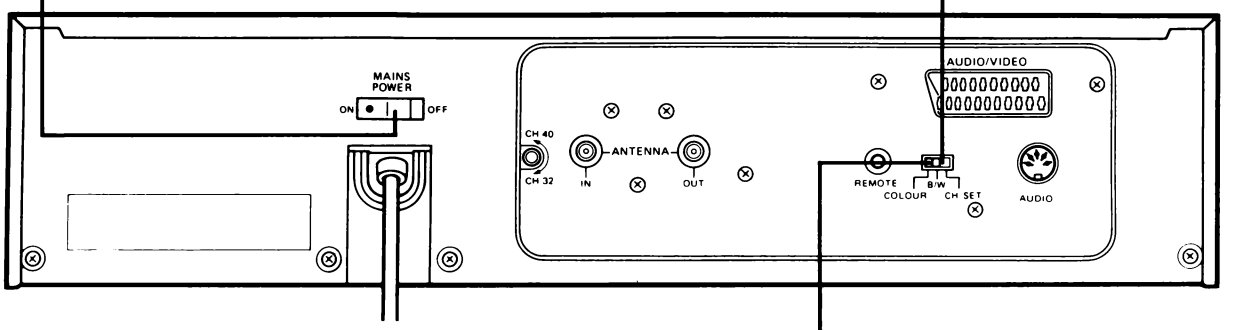
The signal from the RF converter is viewed through a vacant channel not used for broadcasting. The converter channel of all units is set to UHF channel 36 prior to shipment. Setting your TV receiver to UHF channel 36 may provide video playback. However, to obtain the best possible reproduction on your TV receiver, accurate adjustment to the RF converter output is required.

1 Set the rear panel MAINS POWER switch to ON and press the front panel OPERATE button to ON. Turn on the TV receiver.



3 Adjust your TV receiver in the vicinity of UHF channel 36 until you bring in the two white signal bars on the screen as illustrated.
This setting is now the VIDEO CHANNEL of the TV receiver to which the HR-D455EB is connected.

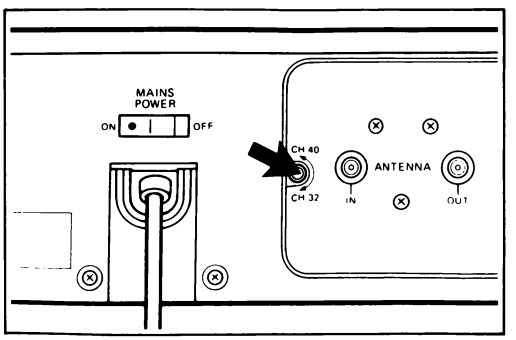
2 Set the video mode switch to CH SET.



4 Reset the video mode switch to COLOUR.

Notes:

- When you adjust your TV receiver to channel 36 for video playback, if some interference noise is seen on the screen because of broadcasts on neighbouring channels or if your preset broadcasts should be affected in picture quality, it is necessary to shift the RF converter output frequency from that of channel 36.

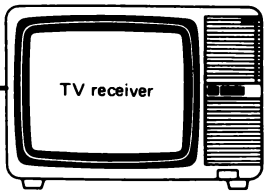


For this purpose, insert a screwdriver into a hole provided on the rear of the set and re-adjust the RF converter frequency adjustment screw in minute steps. Then tune the TV receiver once again until a clear picture is obtained.
This adjustment requires extreme precision and must be done with the utmost care. We recommend that you consult your JVC dealer for making this adjustment.

- Be sure to set the video mode switch to COLOUR after VIDEO CHANNEL tuning has been completed.
- No signal is available from the AUDIO/VIDEO socket while the test signal is being used.
- If a prerecorded VHS cassette is available, TV adjustment for VIDEO CHANNEL setting is also possible using it to obtain a playback picture. Insert the cassette and operate the HR-D455EB for playing back the cassette. Then tune the TV receiver to obtain clear pictures and sound while monitoring the playback picture on the TV screen.
- If your TV receiver is not provided with an AFC circuit, perform fine tuning of the TV receiver when you are actually viewing video cassettes.

PRE-TUNING THE BUILT-IN TUNER

2 Switch ON.
Adjust the TV receiver's channel to your video channel.



4 Open the pre-tuning compartment cover.

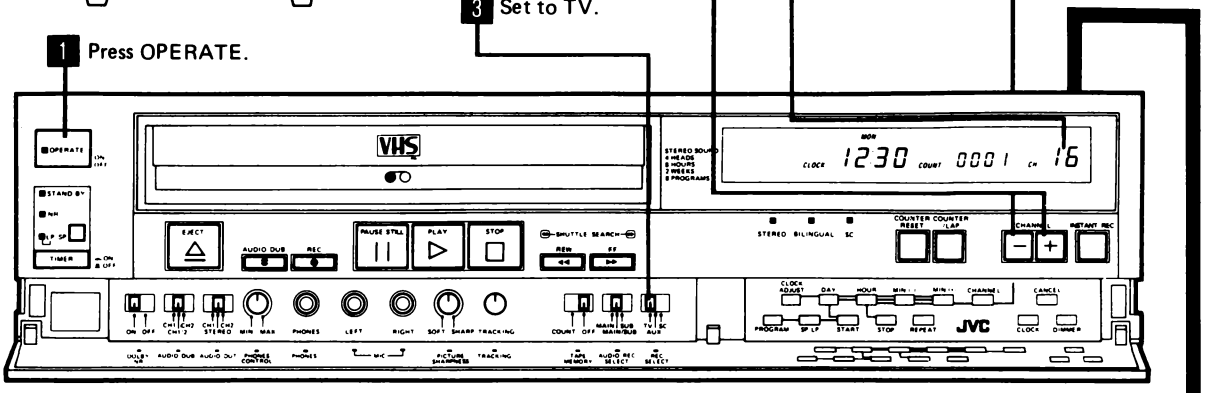
10 After completing pre-tuning for all channels, replace the cover.

6 Specify the channel you wish to preset.

Channel indicator

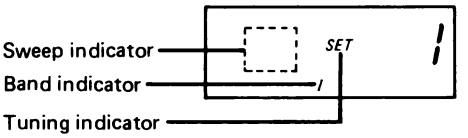
3 Set to TV.

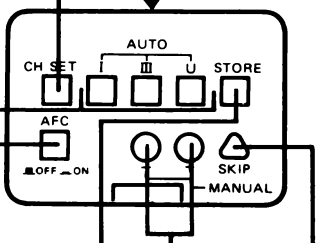
1 Press OPERATE.



9 After completing pre-tuning for all channels, press CH SET to cancel the pre-tuning mode.

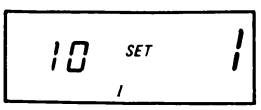
5 Press CH SET.
The following indication will appear on the right position of the display.





7 Press one of the AUTO buttons:
Press "I" when tuning in to VHF channels E2 – E4, S1 – S3, M1 – M2 in Belgium, or channels E2 – E4, X, Y, Z, S1 – S2 in Switzerland. (*E model: channels 2 – 4).
Press "III" when tuning in to VHF channels M3 – M10, E5 – E12 and U1 – U10 in Belgium, or channels S3 – S10, E5 – E12, S11 – S20 in Switzerland.
(*E model: channels 5 – 12).
Press "U" when tuning in to UHF channels 21 throught 69.

- Pressing the AUTO button initiates automatic scanning.
- The SET and "I", "III" or "U" indicators will blink as the auto-scanning process proceeds.
- The last 2 digits of the tape counter functions as a sweep indicator, changing from 0 to 10 to give a rough reference of where tuning in the corresponding band is being performed.



- When any broadcast signal is detected, sweeping will automatically stop and the band indicator will remain lit.

AFC button
(See next page.)

Channel SKIP button
(See next page.)

MANUAL tuning buttons
(See next page.)

8 Press STORE.

- The SET indicator stops blinking.
- This permits the tuned-in station to be memorised so that you can call up the same station at any time by simply pressing the CHANNEL "+" or "–" button to call up the corresponding channel number on the channel display.

CAUTION
- Proceed to next step after making sure that the SET indicator changes from blinking to lighting.

IMPORTANT INFORMATION ON PRE-TUNING

Additional information on the tuning procedure

- If no command is given for about 60 seconds after the CH SET button has been pressed, the channel display will return to the original with the CH indicator illuminated.
- When specifying the channel you wish to preset, the CHANNEL buttons can be pressed either repeatedly for changing the number in a single increment or continuously held for rapid automatic changing.
- When the band indicator (I, III or U) stops blinking in step 7, check to see if the received broadcast is your desired one or not.
- After step 8, change the channel number by pressing the CHANNEL buttons and repeat steps 7 and 8 to preset all necessary channels.
- If the picture is not clear after following all procedures above, perform fine tuning on your television.
- Distorted pictures or sound will be recorded if fine tuning has not been properly performed. Exercise care with this adjustment since the recorded picture and sound cannot be adjusted later.

Manual tuning

- With automatic tuning being performed with the three AUTO buttons, only those stations which have a signal strength exceeding a certain level can be captured.
- To tune in weaker signals, employ manual tuning.
- For manual tuning, first select the band with one of the AUTO buttons and use either one of the MANUAL buttons. Automatic scanning will stop and scanning will be performed only while one of the MANUAL buttons is being pressed.
- When you capture a desired station, press the STORE button in the same manner as for automatic tuning and the tuned-in station will be memorised.

AFC button

- Leave the button in the ON position.
- When the CH SET button is pressed to engage the Channel Set mode, the AFC circuit is automatically switched off regardless of the setting of the AFC button.
- However, if beats cannot be eliminated during manual tuning, press the AFC button to OFF. After manual tuning, be sure not to leave the AFC button in the OFF position.

Skipping unused channels

Though 32 channels are available for presetting to desired TV channels, you may not need all 32 channels. In such cases, unused channels can be skipped so that only preset channels will be called up by pressing the CHANNEL buttons. For this purpose, proceed as follows:

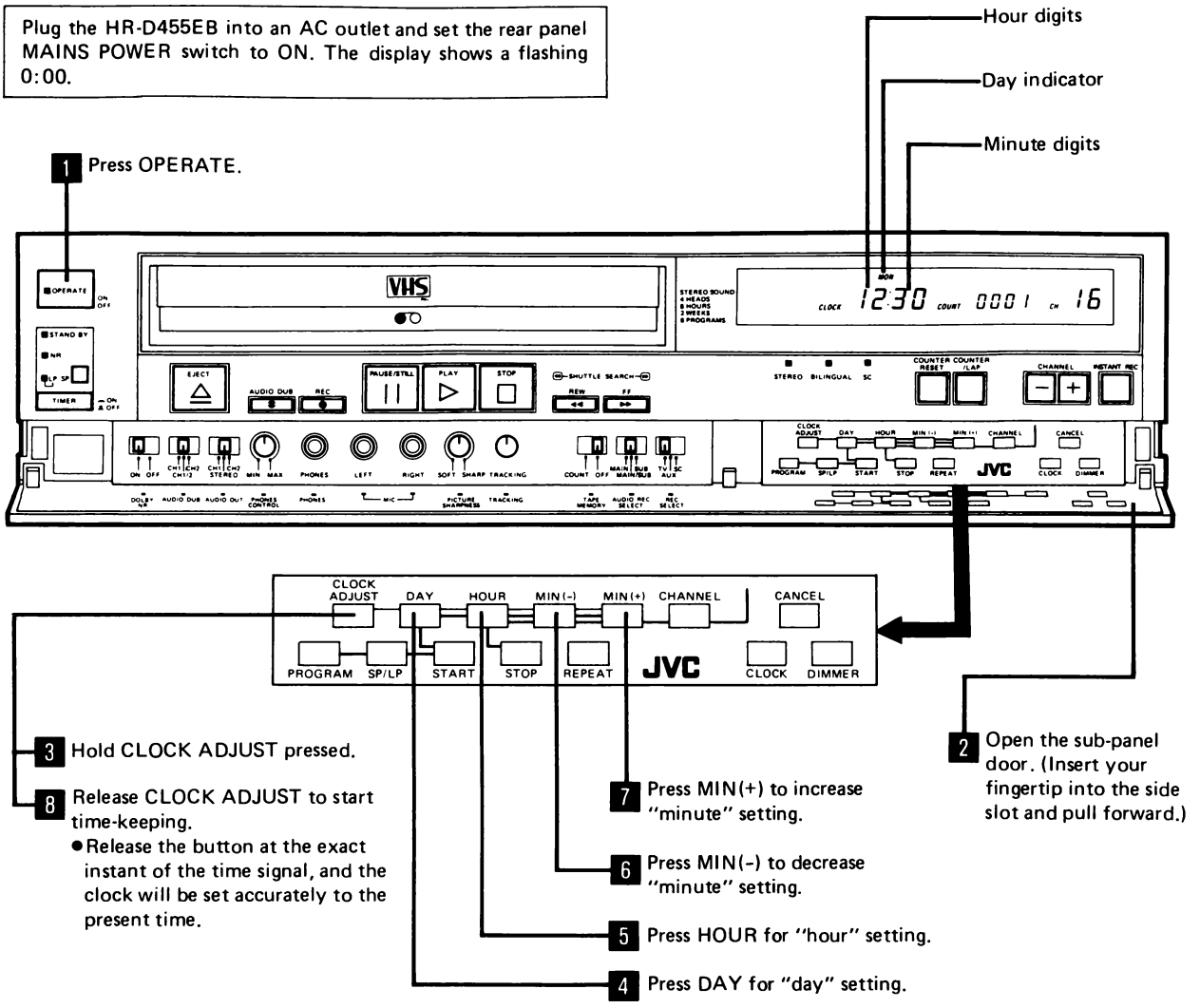
1) Press the CH SET button.
2) Call up the channel number that you wish to skip by pressing either one of the CHANNEL buttons.
3) Press the SKIP button.
   - This completes the procedure for skipping the corresponding channel number.
4) Call up another channel number that you wish to skip and repeat the same procedure above.
5) Press the CH SET button to disengage this mode.

Notes:

- After this mode is disengaged, those skipped channel numbers will not appear on the channel display any more when the CHANNEL buttons are pressed.
- In the Channel Set mode, all channel numbers including skipped ones are successively displayed when the CHANNEL buttons are pressed.
- It is possible to restore the skipped channels for presetting to another TV channel whenever necessary. For this purpose, call up the corresponding channel number in the Channel Set mode and perform pre-tuning. Press the STORE button. Then, the new TV station channel is memorised and called up at any time with the CHANNEL buttons.

CLOCK SETTING

Plug the HR-D455EB into an AC outlet and set the rear panel MAINS POWER switch to ON. The display shows a flashing 0:00.

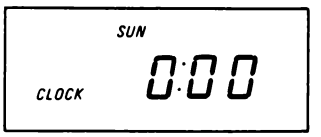


Notes:

- Holding the DAY, HOUR, MIN(+) and MIN(-) buttons pressed continuously advances the corresponding indication automatically. Pressing either of them once advances the indication in single increments only.
- Any sequence of setting the day, hour and minute is possible.

Power failure indicator

The clock display may reset to 0:00 and start to flicker fast. This is not a malfunctioning of the clock, but it indicates that there has been a power failure in excess of one hour. Re-adjusting the time restores the normal condition of the clock display.



- If the period of power outage is within about 60 minutes, correct time-keeping continues when power is reapplied.
- During this 60-minute period, the built-in memory back-up capacitor maintains time-keeping and preset timer memory, though the display blacks out.

LOADING AND UNLOADING A CASSETTE

Loading

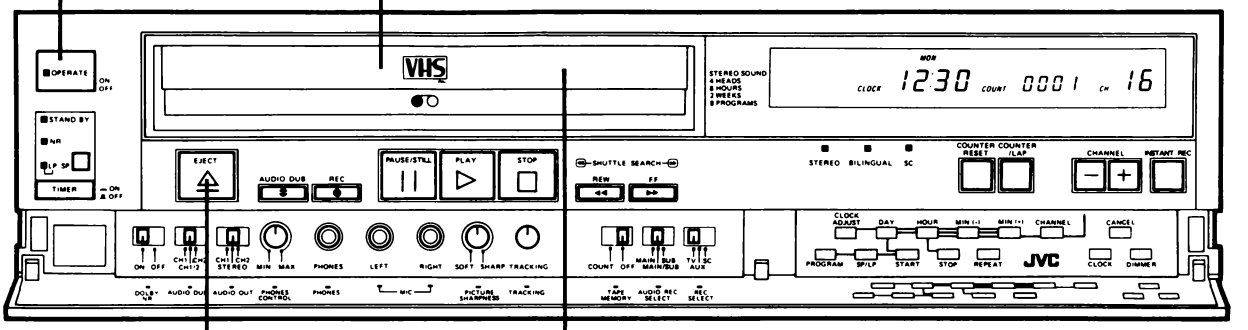
1 Press OPERATE.

2 Insert a cassette with its labelled side facing you.

- With a cassette inserted, a door flap displays the mark to indicate "cassette inserted".

Note:

It might be that, after unpacking your new recorder, the "cassette inserted" mark can be seen already. This does not indicate a defective unit. Simply insert a cassette. After the first loading/unloading cycle, the door will function properly; the flap with the mark will appear when a cassette is inside and be replaced with one without a mark when the cassette is removed.



Unloading

1 Press EJECT.
The cassette will be ejected.

2 Remove the cassette from the loading slot.

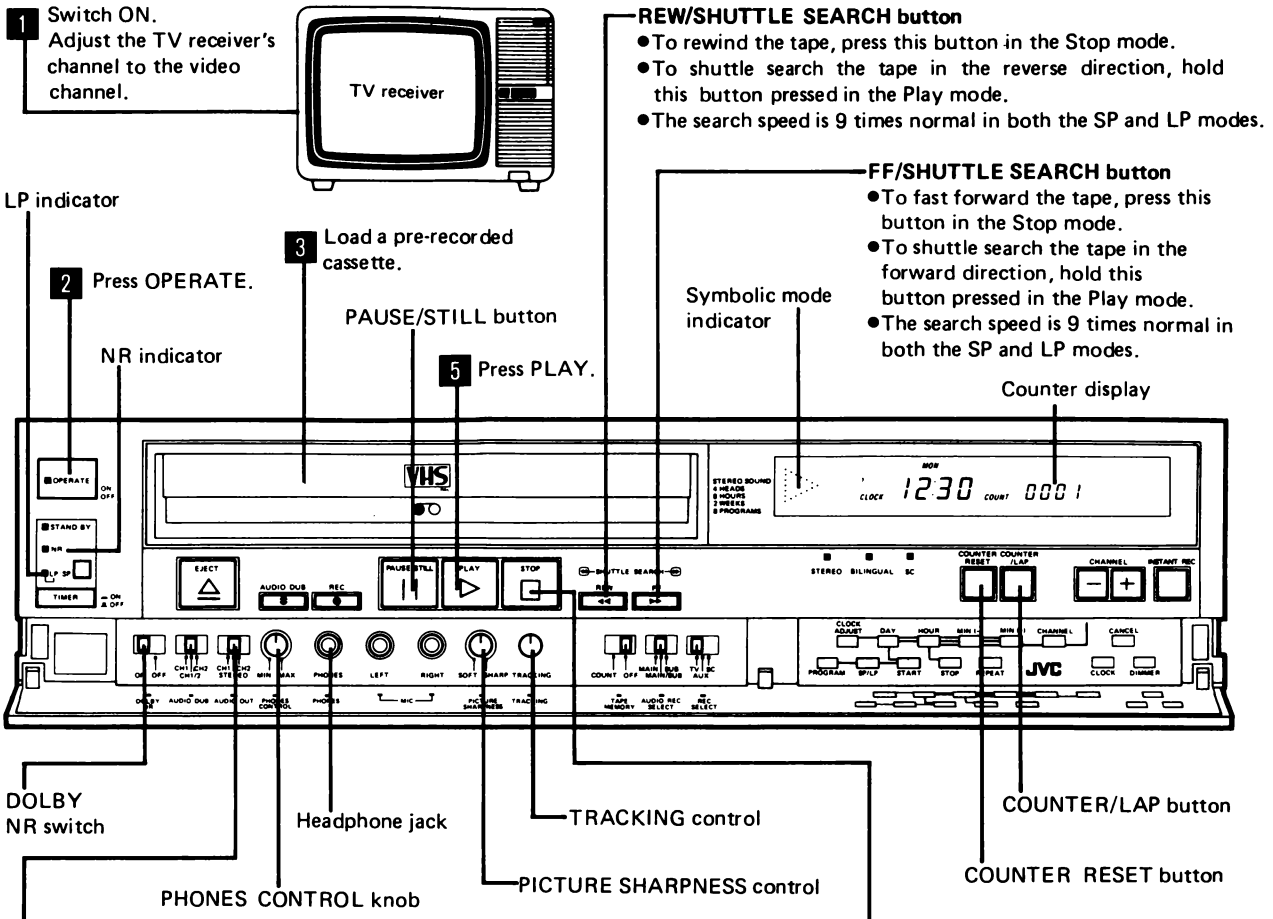
Notes:

- Be sure to insert the cassette firmly into the slot; otherwise, it will be automatically ejected.
- The automatic loading mechanism will operate only when the cassette is inserted correctly.
- A cassette inverted cannot be inserted.

Caution

- Since the HR-D455EB employs a motorised cassette loading system, loading and unloading the cassette are only possible when the power is applied to the recorder section. Do not force the cassette into the cassette loading slot while the OPERATE indicator is off.
- Do not attempt to pull out the cassette once automatic loading has started.

PLAYING BACK A VIDEO CASSETTE


1 Switch ON.
Adjust the TV receiver's channel to the video channel.
TV receiver
REW/SHUTTLE SEARCH button
●To rewind the tape, press this button in the Stop mode.
●To shuttle search the tape in the reverse direction, hold this button pressed in the Play mode.
●The search speed is 9 times normal in both the SP and LP modes.
FF/SHUTTLE SEARCH button
●To fast forward the tape, press this button in the Stop mode.
●To shuttle search the tape in the forward direction, hold this button pressed in the Play mode.
●The search speed is 9 times normal in both the SP and LP modes.
LP indicator
2 Press OPERATE.
3 Load a pre-recorded cassette.
PAUSE/STILL button
NR indicator
5 Press PLAY.
Symbolic mode indicator
Counter display
DOLBY NR switch
Headphone jack
TRACKING control
COUNTER/LAP button
PHONES CONTROL knob
PICTURE SHARPNESS control
COUNTER RESET button
4 Set the AUDIO OUT switch as required.
●To play back stereo recorded tapes, set this switch to STEREO.
●To play back tapes having independent soundtracks, select the corresponding channel.
●Monaural tapes can be played back in any position of this switch. However, it is advisable to set this switch to STEREO for better sound quality.
6 Press STOP at the end of the programme.

Notes:

- The SP/LP button may be in either position. The SP or LP mode recording is automatically detected and played back at a correct speed respectively. The LP indicator lights in the LP mode.
- The tape-end auto rewind mechanism functions in both the Play and Fast Forward modes.
- Set the DOLBY NR switch to ON when playing back tapes recorded with Dolby NR. The NR indicator will light.
- When the PAUSE/STILL button is pressed during playback, a still picture will appear. The still picture can be advanced in a frame-by-frame manner each time this button is pressed. To cancel the Still mode, press the PLAY button.
- Noise bars may appear on the screen if you play back a tape which was recorded using another recorder. In such cases, adjust the TRACKING control. Turn it in either direction to adjust the picture. After playing a particular tape, return the control knob to the centre position.
- When the Still mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- With some televisions, the still picture may be unstable. This is not due to any defect of the unit.
- When listening through headphones, if the volume is too weak or too loud, adjust the PHONES CONTROL knob for comfortable listening.
- In the special-effects playback modes, the picture may become unstable from time to time.

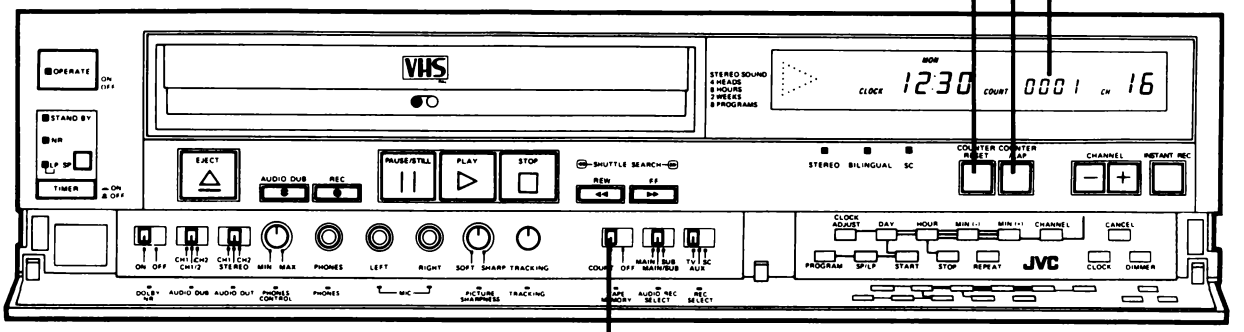
CAUTION:
When a tape recorded from SECAM B/G broadcasts in the LP mode is played back, colours disappear if special-effects (still and shuttle search) are applied.

TAPE MEMORY AND COUNTER/LAP FUNCTIONS

COUNTER RESET button
Press to reset the counter to "0000" for indexing the tape, or to reset the lap time to "0:00" for checking the elapsed recording time.

COUNTER/LAP button
When the OPERATE button is pressed, the tape counter appears on the display with the COUNT indicator illuminated. To change this counter mode to the Lap Time mode to check the elapsed recording time, press the COUNTER/LAP button. The LAP indicator will illuminate and the display will change to the lap time counter.
To change the lap time counter mode back to the tape counter mode, press the same COUNTER/LAP button.

Counter/Lap time display



TAPE MEMORY switch
Counter Memory function

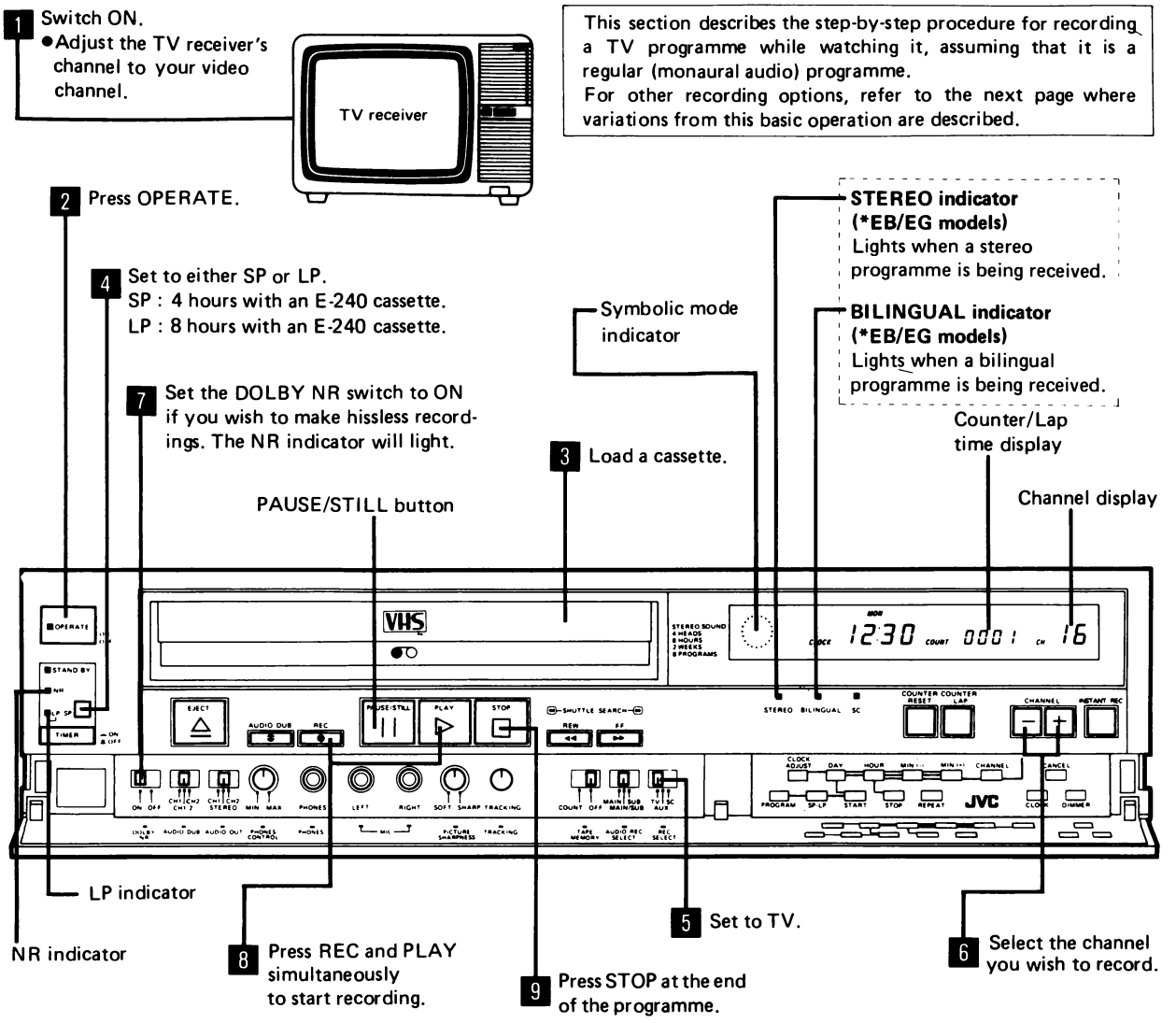
1. Press the COUNTER/LAP button to engage the Counter mode.
2. Press the COUNTER RESET button at a point which you may wish to locate later.
   ●The tape counter will indicate "0000".
3. Set the TAPE MEMORY switch to COUNT.
4. Press the REW (or FF) button when you need to return to the designated point. The tape will rewind (or fast forward) and stop at about the "0000" counter reading.

Notes:

- The lap time is counted up to 99 hours, 59 minutes.
- Unless the COUNTER RESET button is pressed in the LAP mode, the count is maintained even after the OPERATE switch is pressed off (as long as the MAINS POWER switch is set to ON).
- When the Lap mode is engaged during playback, counting does not take place, although the current count is displayed.

BASIC OPERATION FOR RECORDING TV PROGRAMMES

This section describes the step-by-step procedure for recording a TV programme while watching it, assuming that it is a regular (monaural audio) programme.
For other recording options, refer to the next page where variations from this basic operation are described.


1 Switch ON.
●Adjust the TV receiver's channel to your video channel.
TV receiver
2 Press OPERATE.
4 Set to either SP or LP.
SP : 4 hours with an E-240 cassette.
LP : 8 hours with an E-240 cassette.
7 Set the DOLBY NR switch to ON if you wish to make hissless recordings. The NR indicator will light.
PAUSE/STILL button
3 Load a cassette.
Symbolic mode indicator
STEREO indicator (*EB/EG models)
Lights when a stereo programme is being received.
BILINGUAL indicator (*EB/EG models)
Lights when a bilingual programme is being received.
Counter/Lap time display
Channel display
LP indicator
NR indicator
8 Press REC and PLAY simultaneously to start recording.
9 Press STOP at the end of the programme.
5 Set to TV.
6 Select the channel you wish to record.

Notes:

- If there is part of the programme you don't want to record, press the PAUSE/STILL button. To release the Pause mode, press the PLAY button.
- When recording is restarted from the Pause mode, assemble recording is performed so that the playback picture will not distort at the edit point. A few frames recorded before the pause are erased due to overlap of the new recording. This is not due to any defect of the unit.
- When the Pause mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- The built-in tuner's automatic channel lock mechanism prevents the selected channel from being altered during recording. Therefore, if you wish to change the channel during recording, first engage the Pause mode and then select a different channel.
- Sound from microphone(s) connected to the MIC jack(s) can be mixed with the TV sound being recorded.
- If the REC button cannot be engaged, check to see if the cassette safety tab has been removed. (See page 3.)
- When the end of the tape is reached during recording, the tape is automatically rewound to the beginning and stops.
- Press the COUNTER/LAP button to check how much recording time has elapsed. (For more details refer to page 20.)

CAUTION:

- Set the SP/LP button to SP (Standard Play) when you wish recordings to be made in the standard mode with better picture and sound quality.
- As suggested on page 1 under WARNING (at the top of the right column), this recorder may be used to record SECAM broadcasts in certain areas. However, if recordings are made in the LP mode, colour pictures are available only in normal playback.

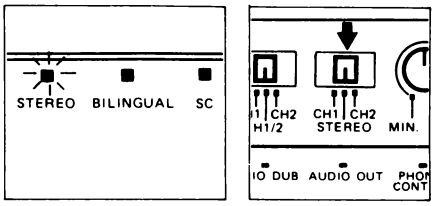
RECORDING A TV PROGRAMME WHILE WATCHING ANOTHER

A programme not being viewed can be recorded while you enjoy another programme. This permits the recorded programme to be played back later at your convenience.
The recording procedure is exactly the same as described on the previous page. The points to be remembered are:

- Select the channel you wish to record with the recorder's channel select buttons.
- Select the channel you wish to view with the TV receiver's channel selector.

RECORDING STEREO TV PROGRAMMES (*EB/EG models)

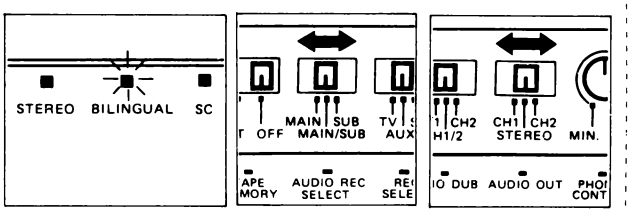
If stereo TV programmes are broadcast in your area, the HR-D455EB automatically receives them in stereo. When a stereo programme is being received, the STEREO indicator lights and recording is made automatically in stereo. To listen to the stereo soundtrack during recording, set the AUDIO OUT switch to STEREO. If this switch is left either in the CH1 or CH2 position, you will hear only one channel while recording, even though the recording is being made in stereo.



RECORDING BILINGUAL TV PROGRAMMES (*EB/EG models)

When a bilingual TV programme is being received, the BILINGUAL indicator lights. To record such a programme, pay attention to two additional controls and the basic operation described on the previous page.

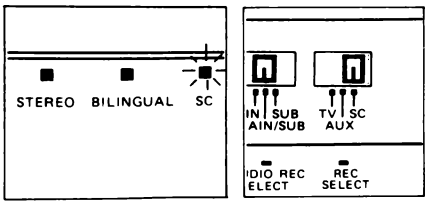
- Set the AUDIO REC SELECT switch as required.
  - MAIN: To record only the soundtrack transmitted on the main channel (local language).
  - MAIN/SUB: To record both soundtracks transmitted on the main and sub channels (local and foreign languages).
  - SUB: To record only the soundtrack transmitted on the sub channel (foreign language).
- Set the AUDIO OUT switch as required.
  When you are recording only a local-language soundtrack, or a foreign-language soundtrack, you can listen to the sound being recorded regardless of the setting of this switch.
  - CH1: To listen to a local-language soundtrack while recording both soundtracks.
  - STEREO: To listen to a stereo soundtrack while recording a stereo programme.
  - CH2: To listen to a foreign-language soundtrack while recording both soundtracks.



RECORDING FM SIMULCAST TV PROGRAMMES

FM simulcast TV programmes can be recorded (in areas where such programmes are broadcast) using an FM stereo tuner. Connect necessary components. Select the TV channel broadcasting the simulcast programme with the recorder's CHANNEL select buttons and tune the FM stereo tuner to the station broadcasting the soundtrack for this TV programme.
The only difference from the basic recording procedure is in step ■

- Set the REC SELECT switch to SC.
  Then the SC indicator will light and the video signal will be recorded from the built-in tuner and the audio signal will be recorded from the FM stereo receiver.



AUTOMATIC TIMER RECORDING

The built-in 14-day/8-event programmable timer permits recording of preset channels on preset days, at preset times for preset lengths while you are away.

CAUTION: (*EB/EG models)
Set the AUDIO REC SELECT switch as required, when you have preset to record bilingual programmes. With several programmes preset at a time, it is impossible to select the soundtrack independently for each programme.

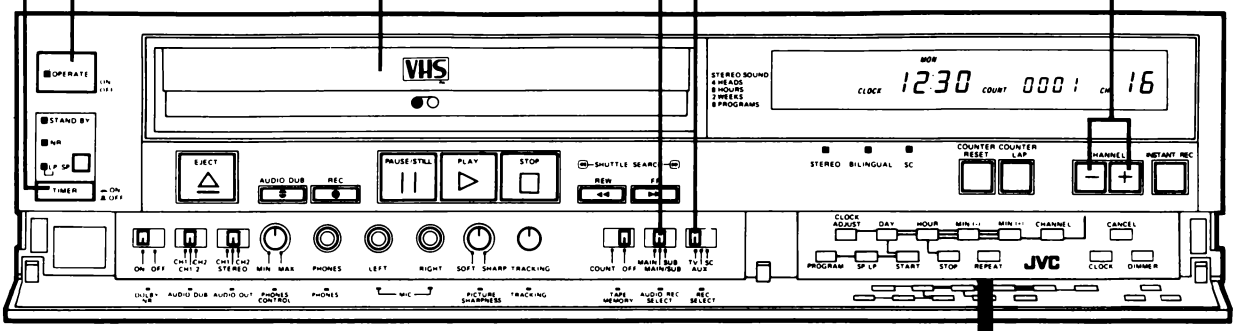
16 Press TIMER to ON.
- The TIMER indicator will light together with the numbers of the programmed memories.

14 Press CHANNEL "+" or "-" to obtain desired channel indication.

1 Press OPERATE.

2 Load a cassette.

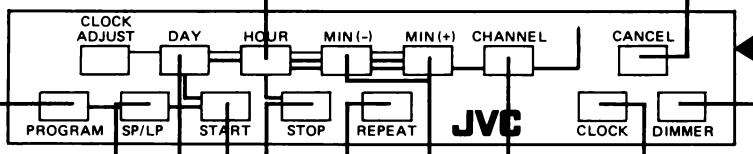
3 Set to TV.



11 Press HOUR to obtain desired "hour" indication.

8 Press HOUR to obtain desired "hour" indication.

CANCEL button



DIMMER button

REPEAT button

15 Press CLOCK to change the display to the Clock mode.
- If no command is entered within about 60 seconds, all displays will be restored automatically.

7 Press DAY to obtain desired "day" indication.

13 Press CHANNEL for setting the channel from which you want to record.
- The PROG indicator will flash.

5 Select the mode of recording.
SP: 4 hours with an E-240.
LP: 8 hours with an E-240.
The REC SP or REC LP indicator will light correspondingly.

9 Press MIN(+) or MIN(-) to obtain desired "minute" indication.

12 Press MIN(+) or MIN(-) to obtain desired "minute" indication.

4 Press PROGRAM.
- The display will change to the Timer Set mode. You are ready to enter the data into No. 1 programme memory. If you want to change the programme number, press the PROGRAM button a required number of times.

10 Press STOP for switch-off time setting.
- The STOP indicator will flash.

6 Press START for day and switch-on time setting.
- The START indicator will flash.

IMPORTANT INFORMATION ON TIMER RECORDING

Setting the START and STOP times

- It is not possible to set the START and STOP times unless the clock time has previously been set.
- Enter the data while the START or STOP indicator is flashing (about 60 seconds).
- Holding the DAY, HOUR, MIN(+) and MIN(-) buttons pressed for more than 1 second continuously advances the indication automatically. Pressing the buttons once advances the indication in single increments only.
- The sequence of day indications: from "1st SUN" (first Sunday) to "1st SAT" (first Saturday), then "2nd SUN" to "2nd SAT", and then an everyday indication.
- After setting the START time, when the STOP button is pressed, initial STOP time indication will be the same as the start time.
- Unless the START time has been properly set, STOP time setting is not possible.
- The STOP time can be set within 24 hours from the START time. If the hour setting for the STOP time runs into the following day, there is no need to set the day (the DAY button does not function when the STOP time mode is engaged). Recording will stop at the preset time on the following day, even though the day indication is not displayed.

Setting the channel

- Enter the data while the PROG indicator is flashing (about 60 seconds).
- Setting the channel is independent from the START or STOP button. Therefore, it is possible to select the channel either before or after setting the START and STOP times.
- The currently tuned channel locks in the Programme Set mode and, when the display returns to the Clock mode, the locked channel is displayed.

Setting the recording mode

- The recording mode (SP or LP) can be specified for each preset programme using the SP/LP button on the timer setting section. The setting of the regular SP/LP button on the main front panel has no effect on timer recording.

Repeating the programmed data

- When you want to record a daily serial for one week, just obtain the everyday indication when setting the day.
- If you wish to hold the preset data in memory in order for recordings to be made repeatedly according to the same data (for example, at the same time on the same day every week), press the REPEAT button. The REPEAT indicator will light.
- The combination of the everyday indication and REPEAT indication means that recording will be repeated every day indefinitely.

Cancelling the preset data

- The preset programmes can be cancelled by pressing the CANCEL button. For this purpose, first engage the Programme Set mode for the number you wish to cancel and then press the CANCEL button.
- The PROGRAM and CANCEL buttons cannot be pressed simultaneously.

Checking the programmed data

- Checking and re-programming can be performed anytime as long as the OPERATE button is in the ON position (even when the TIMER button has already been engaged in the ON position).
- While recording is actually taking place, the switch-off time can be changed. If the START button is pressed, the switch-on time is displayed, but the START indicator does not flash, indicating that changing of the switch-on time is not possible.
- While recording is actually taking place according to one preset programme, all other preset programmes can be checked or re-programmed.

TIMER indicator

- When the TIMER button is pressed to ON with a cassette loaded and the timer correctly programmed, the TIMER indicator on the display will light with the corresponding preset programme number(s) also lighting and the power is turned off.
- When you have preset several programmes at a time, confirm that all the preset programme numbers light together with the TIMER indicator when the TIMER button is pressed. The programme whose number does not light has not been correctly preset (for instance, the preset switch-on and switch-off times are the same, or no switch-off time has been entered). Recheck the programmed data.
- If all programmes have been wrongly preset, the TIMER indicator will flash for about 10 seconds when the TIMER button is pressed, and then remains lit with no programme number lighting.
- If the TIMER button is pressed when a cassette is not loaded, the TIMER indicator will continue blinking.
- If a cassette with its safety tab removed has been loaded, it will be ejected automatically when the TIMER button is pressed. The TIMER indicator will continue blinking.

Timer operation

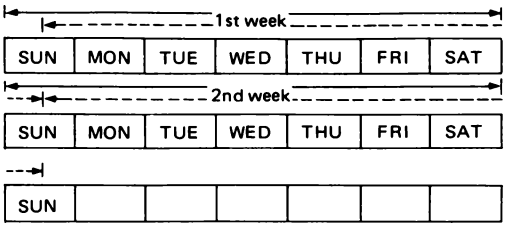
- Tape loading starts 10 seconds before the preset switch-on time and the recording start signal is triggered 2 seconds before the preset time so that recording starts exactly at the preset time.
- During timer recording, the number of the programme that is presently operating will be flashing.
- After timer recording, the power is switched off and the auto rewind mechanism does not function. If the end of the tape is reached during timer recording, the cassette is automatically ejected and then the power is switched off.
- If a power failure should occur (and last longer than about 60 minutes), not only time-keeping stops (see page 17), but also all the preset data will be cancelled. A flashing 0:00 indicates this after power has been reapplied. In such cases, first correct the time indication and then re-enter the programming data.

FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER

Two-week timer

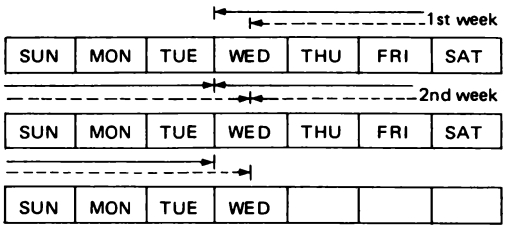
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1st MON" is Monday of the current week and the "2nd MON" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1st SUN" is the next Sunday and the "2nd SUN" is the Sunday after next.
- In the latter case, the "1st SUN" is the current Sunday and the "2nd SUN" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1st MON", "1st TUE" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and not Monday of the current week.
- Similarly, the "2nd MON", "2nd TUE" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1st TUE". To record on Thursday of the next week, set "2nd THU".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

8-programme timer

"8-programme" presetting capacity means that you can have 8 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 8 different TV programmes, either on the same day or on different days.
Each programme (No. 1 through No. 8) entry contains information on "TV channel number", "day", "start time", "stop time", "SP or LP" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV channel number	Day	Start time	Stop time	Rec mode	Repeat
2	12	1st WED	10:30	11:30	LP	–

Variety of setting possibilities

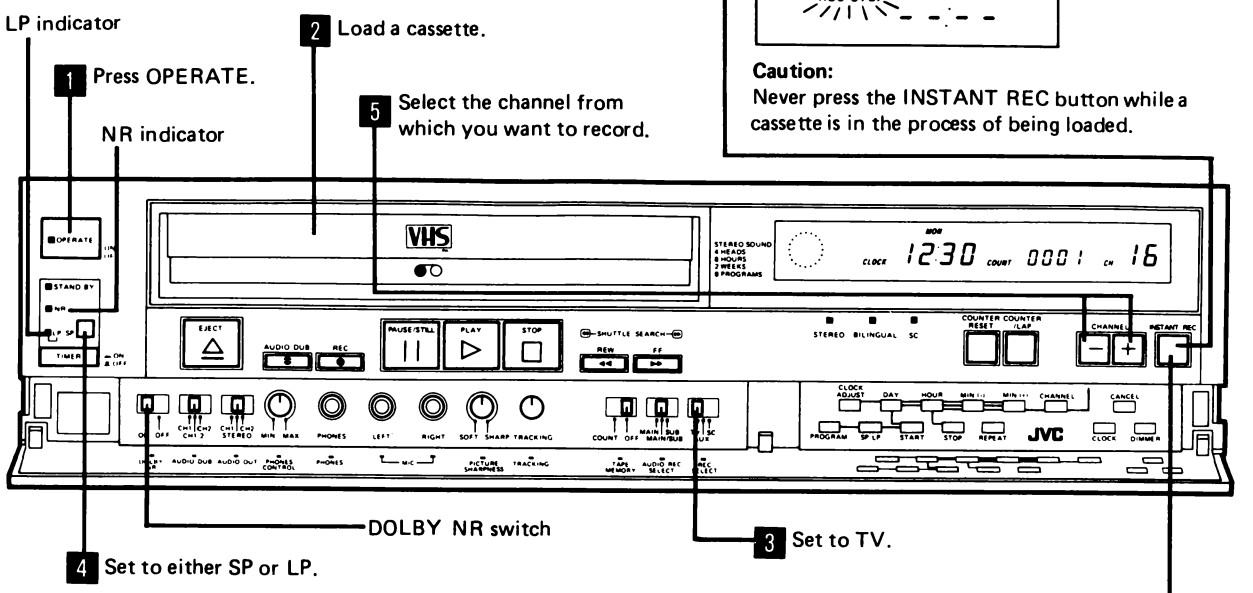
- You can set for some day of the 1st week or the 2nd week.
- You can set for one day of every week by first setting that day of the 1st week and pressing the REPEAT button.
- You can set for one day of every week starting from the second week by first setting that day of the 2nd week and pressing the REPEAT button.
- You can set for all days. For this setting, obtain the indication "SUN MON TUE WED THU FRI SAT", and recordings will be repeated at the same time everyday for one week.
- You can set for all days week after week. For this setting, first obtain the indication as mentioned above and then press the REPEAT button. And recordings will be made everyday at the same time week after week.
- All the above applies for all 8 programme entries.

Programme priority

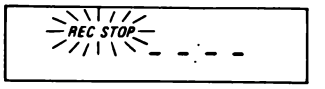
- If you have preset two programmes for the same day and the same start time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the later one.

INSTANT RECORDING

Besides starting and stopping a recording as usual, the HR-D455EB offers a more convenient possibility: starting by the push of a single button, and recording will stop automatically after a certain period of time. Use this facility for starting a recording just before you go to bed or leave home.

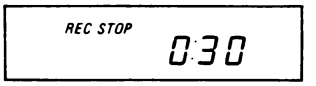

LP indicator
1 Press OPERATE.
NR indicator
2 Load a cassette.
5 Select the channel from which you want to record.
DOLBY NR switch
4 Set to either SP or LP.
3 Set to TV.

6 Press INSTANT REC.
- The following indication will appear on the display, to show that the recorder is ready to start recording.
- The REC STOP indicator on the display will flash.



Caution:
Never press the INSTANT REC button while a cassette is in the process of being loaded.

7 Press INSTANT REC once again.
- Recording will begin immediately and the following indication will appear on the display, showing that recording will automatically stop and power will switch off after 30 minutes.
- The REC STOP indicator remains lit.

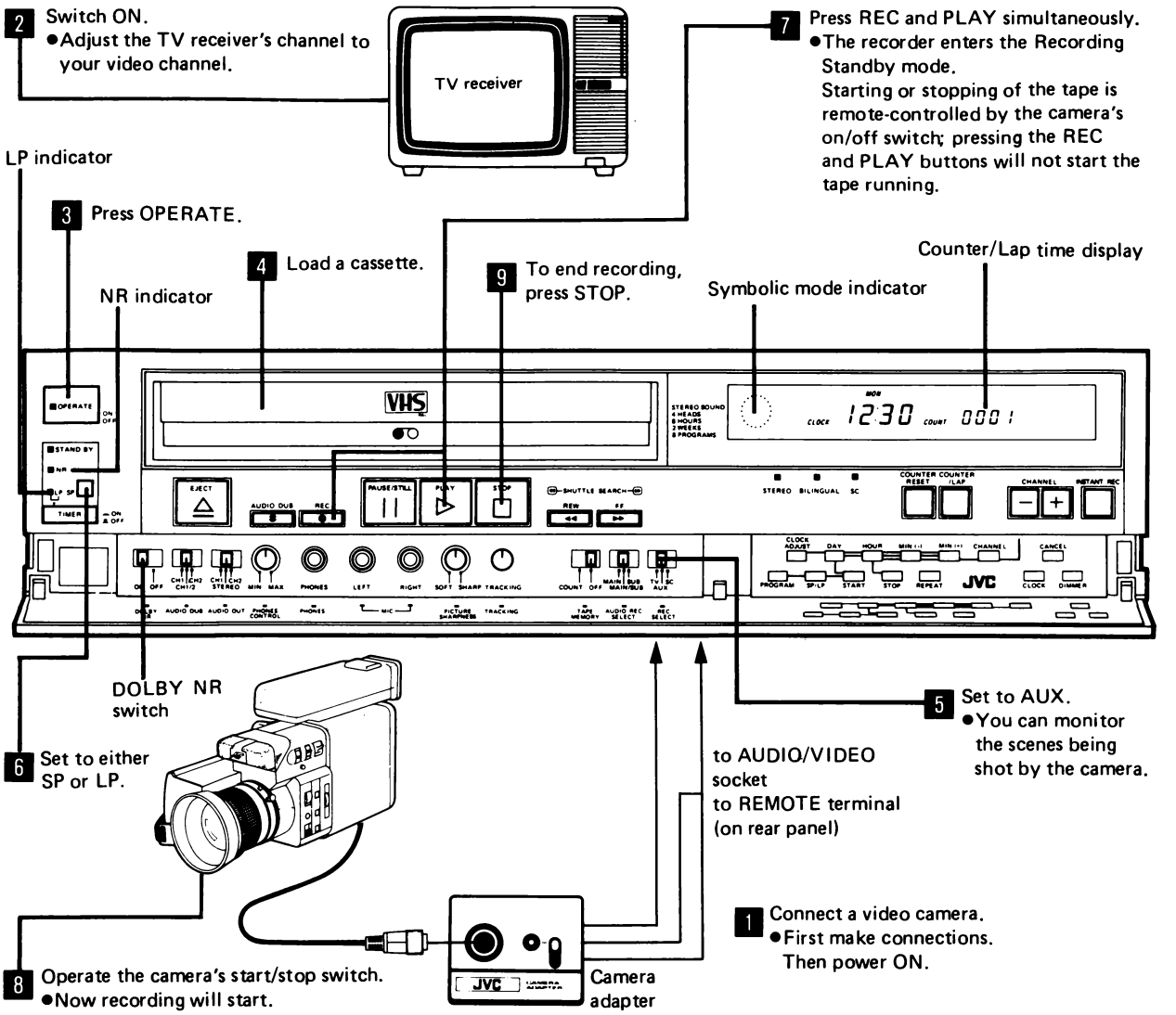


8 Each time the INSTANT REC button is pressed, recording time increases by 30 minutes.
- For a more precise time setting, use the HOUR, MIN(+) and MIN(-) buttons to set to the exact time required.

Notes:

- If the INSTANT REC button is not pressed a second time within about 10 seconds after it has been pressed once, the Instant Record mode will be cancelled and the display will change back to the Counter mode.
- Timer setting in the Instant Record mode is possible up to a maximum of 4 hours when the INSTANT REC button only is used. If the MIN(+) button is used after 4:00, this setting can be increased up to 4 hours, 59 minutes. If 4:59 is to be obtained, simply press the MIN(-) button once.
- While recording is in progress, the displayed time counts down; when 0:00 is reached, the Record mode is released after 10 seconds. The power will be switched off.
- If you want to stop recording after having started recording in the Instant Record mode, press the STOP button.
- The instant recording function can also be used as a sleep timer. If you press the INSTANT REC button during normal recording, the REC STOP indicator will light on the display and the indication "0:30" will be obtained, showing that recording will stop automatically after 30 minutes. The time span can be adjusted in the same way as for instant recording up to 4 hours, 59 minutes.
- Instant recording has priority over all other modes; you can start recording from any mode using the INSTANT REC button, even from rewind or fast forward.
- If the INSTANT REC button is pressed with a non-recordable cassette loaded (one with its safety tab removed), the cassette will be automatically ejected.
- If you want to perform instant recording after you have set the timer and pressed the TIMER button to ON, press the INSTANT REC button as usual. Power will be turned on and instant recording will start. After instant recording has been performed, the Timer mode is automatically re-entered and power is turned off. The preset time for instant recording has priority over the programmed preset times. Before pressing the INSTANT REC button, make sure that the instant recording time will not eventually overlap the programmed preset times.
- If the programmed switch-on time for a timer recording should come after the switch-off time of the instant recording, this timer recording will still be made automatically.

RECORDING WITH A VIDEO CAMERA


2 Switch ON.
●Adjust the TV receiver's channel to your video channel.
TV receiver
7 Press REC and PLAY simultaneously.
●The recorder enters the Recording Standby mode.
Starting or stopping of the tape is remote-controlled by the camera's on/off switch; pressing the REC and PLAY buttons will not start the tape running.
LP indicator
3 Press OPERATE.
4 Load a cassette.
9 To end recording, press STOP.
NR indicator
Symbolic mode indicator
Counter/Lap time display
DOLBY NR switch
6 Set to either SP or LP.
5 Set to AUX.
●You can monitor the scenes being shot by the camera.
to AUDIO/VIDEO socket
to REMOTE terminal
(on rear panel)
1 Connect a video camera.
●First make connections. Then power ON.
8 Operate the camera's start/stop switch.
●Now recording will start.
Camera adapter

Notes

- If feedback noise (whistling or howling) is heard from the TV receiver, reduce the volume or move the microphone, being used, farther away from the TV receiver.
- If microphone(s) are connected to the HR-D455EB's MIC jacks, this microphone input is recorded mixed with the camera's built-in microphone.
- When a video camera is connected to the recorder via an adapter as illustrated with its remote control cable plugged into the REMOTE terminal, the recorder enters the Pause mode.
- For camera operation refer to the instruction manual for the relevant camera.

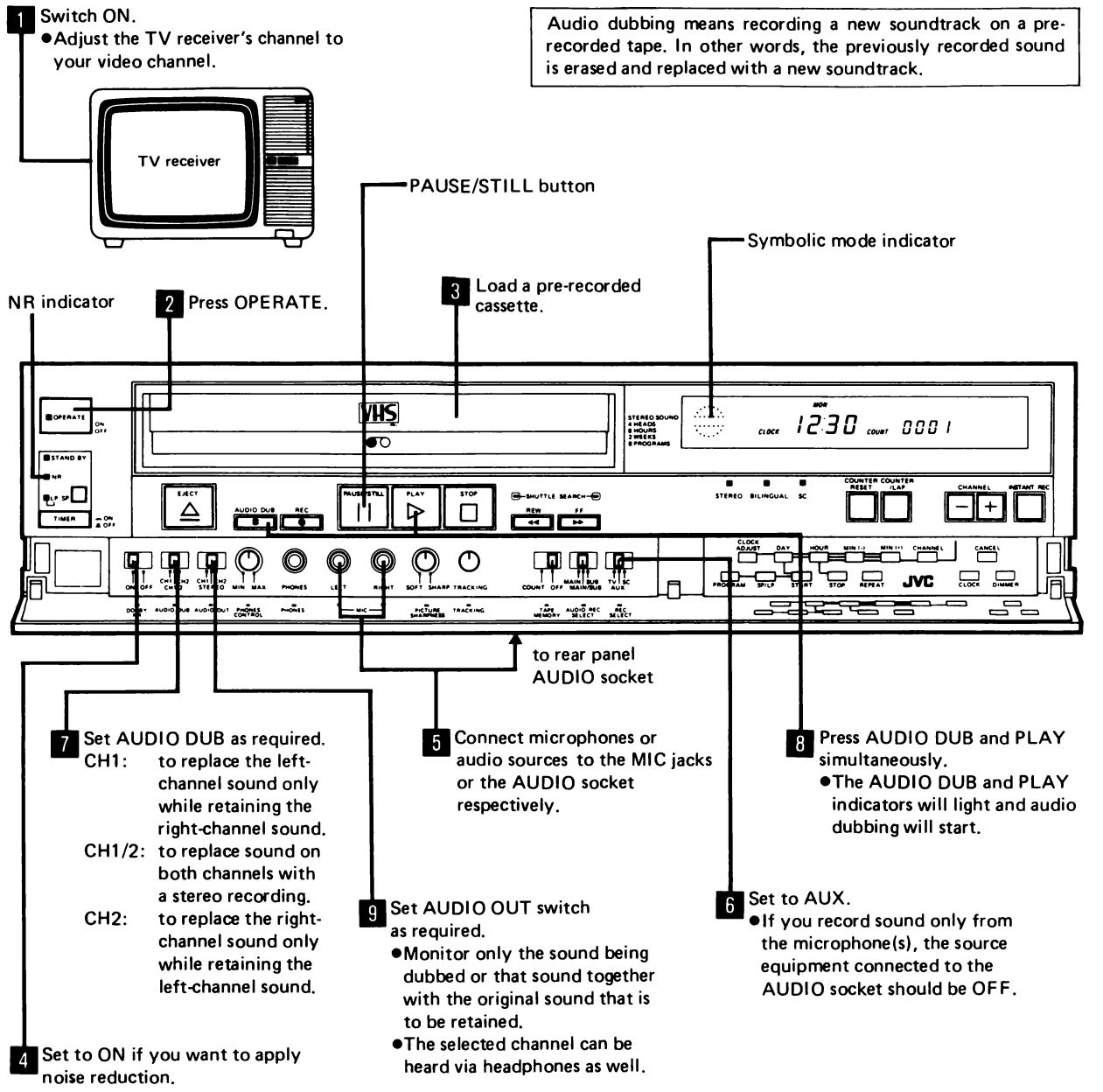
Possibilities of audio recording depending on the type of the camera and the connection of microphones

Type of recording / Audio source	Monaural recording	Stereo recording (2-channel recording)
Camera's built-in mike	*Recorded on the main channel (CH1)	–
Camera's built-in mike + LEFT mike	–	Recorded on main and sub channels (CH1 and 2). Sound from camera's built-in mike is mixed on main channel (CH1).
LEFT mike + RIGHT mike	–	Stereo recording. Sound from camera's built-in mike is mixed on main channel (CH1).
Camera's built-in mike + RIGHT mike	–	Camera's built-in mike is recorded on main channel (CH1) and recorder's RIGHT mike is recorded on sub channel (CH2).
Stereo signal from 2-channel camera**	–	Left channel signal on main channel (CH1) and right channel signal on sub channel (CH2).

* Depends on the type of camera used. Refer to the instruction manual for the camera.
** For more details about stereo recording with a camera having two audio channels, refer to the instruction manual for the camera.

AUDIO DUBBING

Audio dubbing means recording a new soundtrack on a pre-recorded tape. In other words, the previously recorded sound is erased and replaced with a new soundtrack.

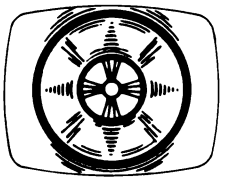
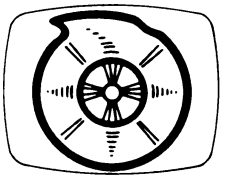
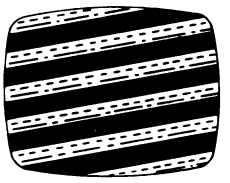
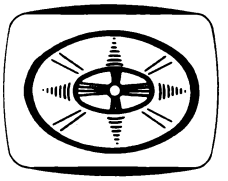
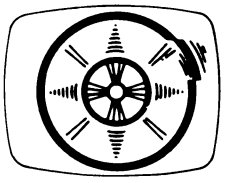

1 Switch ON.
●Adjust the TV receiver's channel to your video channel.
TV receiver
PAUSE/STILL button
Symbolic mode indicator
NR indicator
2 Press OPERATE.
3 Load a pre-recorded cassette.
to rear panel AUDIO socket
7 Set AUDIO DUB as required.
CH1: to replace the left-channel sound only while retaining the right-channel sound.
CH1/2: to replace sound on both channels with a stereo recording.
CH2: to replace the right-channel sound only while retaining the left-channel sound.
5 Connect microphones or audio sources to the MIC jacks or the AUDIO socket respectively.
8 Press AUDIO DUB and PLAY simultaneously.
●The AUDIO DUB and PLAY indicators will light and audio dubbing will start.
9 Set AUDIO OUT switch as required.
●Monitor only the sound being dubbed or that sound together with the original sound that is to be retained.
●The selected channel can be heard via headphones as well.
6 Set to AUX.
●If you record sound only from the microphone(s), the source equipment connected to the AUDIO socket should be OFF.
4 Set to ON if you want to apply noise reduction.

Notes

- Use a high-impedance microphone.
- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the microphone(s) farther away from the TV. Recording is being performed even if sound is not heard from the TV receiver. If you want to monitor the sound being recorded, connect headphones to the PHONES jack.
- The pause function facilitates audio dubbing. First play back the pre-recorded tape and press the PAUSE/STILL button at the point from which you wish to start audio dubbing. If necessary, adjust the point accurately by pressing the PAUSE/STILL button a few more times. Then press the AUDIO DUB and PLAY buttons simultaneously. This permits you to start audio dubbing exactly at the right point.

ADJUST YOUR TV RECEIVER WHEN...

Still Playback may require adjusting your TV receiver. If your TV receiver shows the following symptoms during Still Playback, adjust the TV receiver first.

Symptom	Adjustment
Picture vibrates vertically. 	Turn the V-Hold knob slightly for stabilizing.
The upper portion of the picture drifts horizontally. 	Turn the H-Hold knob slightly for stabilizing.*
Picture rolls. 	Turn the H-Hold knob slightly for stabilizing.
Picture is flattened vertically. 	Inherent in your TV receiver.
Only a portion of the picture continues to flicker. 	Not adjustable. Inherent in your TV receiver.

HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of use causes such troubles. In this case, head cleaning requiring highly technical care is necessary.

*For head cleaning, consult the nearest JVC dealer.

If the V-Hold and H-Hold knobs are not provided on your TV receiver, please consult your JVC dealer.

*If an unsatisfactory result is obtained, it is necessary to adjust the AFC circuit of the TV receiver.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

POWER AND TAPE TRANSPORT PROBLEMS

Symptoms	Check points
No power is applied to the recorder.	• Is the power cord disconnected? – Connect it. • Is the rear panel MAINS POWER switch set to OFF? – Set to ON.
Clock is functioning properly, but the recorder cannot be powered.	• Is the TIMER button pressed to ON? – Press it to OFF.
Tape does not run during recording.	• Is the PAUSE/STILL button pressed to ON? – Press the PLAY button.
Tape stops in the Rewind or Fast Forward mode.	• Is the TAPE MEMORY switch set to COUNT? – Set it to OFF.
Tape will not rewind or fast forward.	• Is the tape already fully rewound or fast forwarded? – Check the cassette.

RECORDING PROBLEMS

Symptoms	Check points
Recording cannot be started.	• Is a cassette loaded? • Is the safety tab on the cassette removed? – Reseal the slot with cellophane tape.
TV broadcasts cannot be recorded.	• Is the REC SELECT switch set to AUX? – Set it to TV.
Camera recording is not possible.	• Is the camera correctly connected? • Is the REC SELECT switch set to a position other than AUX? – Set it to AUX.
Simulcast recording is not possible.	• Is the REC SELECT switch set to a position other than SC? – Set it to SC. • Is an audio source correctly connected to the AUDIO socket? – Check connections.
Timer recording is not possible.	• Have you set the clock correctly and programmed the timer correctly? – Check once again. • Is the TIMER button pressed to OFF? – Press it to ON.
Audio dubbing is not possible.	• Is the safety tab on the cassette removed? – Reseal the slot with cellophane tape.

PLAYBACK PROBLEMS

Symptoms	Check points
Playback picture does not appear while the tape is running.	• Is the TV receiver's channel selector set to the correct video channel? – Set it to the RF converter channel. (See page 14.)
Noise appears on the search and still pictures.	• This is normal.
Noise appears during normal playback.	• Adjust the TRACKING control.
Playback picture is blurred or interrupted while TV broadcasts are clear.	• Video heads may be dirty. – Head cleaning is necessary. Consult your nearest JVC dealer.
Playback sound is different from that intended to be recorded.	• Is a microphone plugged in? – Unplug it.

OTHERS

Symptoms	Check points
Whistling or howling is heard from TV.	• Move camera or microphone away from TV or reduce TV sound volume.
Clock setting is not possible.	• Press the OPERATE button to ON. (The TIMER button should be OFF.)
Some channels are skipped over when selecting a channel.	• Those channels are preset to be skipped over. If you need them, restore them.
Channel cannot be switched.	• Is recording in progress? – During recording, you cannot change the channel.
No control button functions.	• Set the MAINS POWER switch to OFF once and set to ON again.

SPECIFICATIONS (*EB model)

General

Power requirement : 220 V∿, 50/60 Hz
Power consumption : 35 watts
Temperature : Operating: 5°C to 40°C
Storage: -20°C to 60°C
Operating position : Horizontal only
Weight : 8.7 kg
Dimensions : 435(W) x 105(H) x 375(D) mm

Tape deck section

Format : VHS PAL standard
Video signal system : PAL colour and CCIR monochrome signals, 625 lines
Video recording system : Luminance: FM recording
Colour: Phase shift & converted subcarrier direct recording
Scanning system : Rotary, slant azimuth, two-head helical scan system with two pairs of video heads, one pair exclusively for the SP mode and one pair for the LP mode.
Tape width : 12.65 mm
Tape speed (SP) : 23.39 mm/sec. ±0.5 %
(LP) : 11.70 mm/sec. ±0.5 %
Maximum recording time (SP) : 240 min. with E-240 video cassette
(LP) : 480 min. with E-240 video cassette

Video

Input : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output : 1.0 Vp-p, 75 ohms, unbalanced
S/N ratio : 43 dB (Rohde & Schwarz noise meter) with PICTURE SHARPNESS control at centre position
Horizontal resolution : 250 lines with PICTURE SHARPNESS control at centre position

Audio

No. of audio channels : 2 channels
Input : Mic: -67 dBs, high impedance, unbalanced
AUDIO connector (5-pin DIN): -20 dBs, 50 k-ohms, unbalanced
AUDIO/VIDEO socket (21-pin): -8 dBs, 50 k-ohms, unbalanced
Output level : AUDIO connector (5-pin DIN): -6 dBs, high impedance load
AUDIO/VIDEO socket (21-pin): 0 dBs, high impedance load
Output impedance : Less than 1 k-ohm, unbalanced
Signal-to-noise ratio : More than 46 dB (Noise reduction on)
Frequency range : 70 Hz to 10,000 Hz

TV tuner/RF section

Channel storage capacity : 32 channels
Aerial input : VHF band I, 47 – 118 MHz
VHF band III, 118 – 300 MHz
UHF band IV/V, 470 – 862 MHz
Aerial output : UHF channels 32 – 40 (adjustable)

Digital clock/timer

Clock display : 24-hour fluorescent digital display with day indication
Reference frequency : Quartz controlled
Start time setting : Within 2 weeks
Programming capacity : 8 programmes

Accessories : Aerial cable,
Video cassette,
Infrared remote control unit,
"R6" battery x 2

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

SECTION 1
GENERAL DESCRIPTION

1.1 MAIN FEATURES

1. Separate sets of rotary heads are used for the Standard Play (SP) mode and Long Play (LP) mode. This design allows high picture quality during slow speed (up to 8 hours) operation.
2. Automatic Editing Function (AEF) utilizes a back-space system for smooth transitions between separately recorded program segments.
3. The Shuttle Search feature functions in both forward and reverse playback directions. Speed in SP and LP modes is approximately 9 times that of the normal playback speed. During Shuttle Search, the phase lock system stabilizes noise appearing in the picture, while sound is muted.
4. Simple Still mode and Frame Advance
   Random noise appears in the picture during this mode and sound is muted.
5. Stereo sound recording and playback
   An FM stereo receiver can be connected for SC (simul-cast) mode operation.
6. Flexible audio dubbing permits changing the sound portion of a previously recorded tape.
   - CH1 : Sound dubbing of the CH1 (L) audio track
   - CH1/CH2 : Sound dubbing of both CH1 and CH2 audio tracks
   - CH2 : Sound dubbing of the CH2 (R) audio track
7. 14 day 8 event programmable timer
   About 60 minutes memory back-up
   SP/LP selection
8. Auto-scanning voltage synthesizer tuner
   16 channels or 32 channels
9. Full-function infrared wireless remote control
10. The fluorescent display panel (FDP) uses symbolic mode indicators for easy recognition of the mode in progress. A dimmer function is also included.
11. A stereo headphone jack is provided together with a volume control.
12. The Instant Recording function can be set for up to 4 hours 59 minutes.
13. Lap indicator shows the elapsed recording time.
14. Low profile design is only 105 mm high. The front cassette loading system further conserves space.

1.2 MECHANISM CONTROL OPERATIONS

1.2.1 Mechacon operations

1. Power ON

The rear panel MAINS POWER switch is set to ON.

The power ON state allows a cassette to be inserted and removed. In this state, the front panel LED lights and all machine operations are enabled. This state is attained when:

1) Front panel OPERATE button is set to ON. If it is already ON, briefly set it to OFF, then return to ON. The power ON state can also be set from the remote control unit. At this time, the TIMER button must be OFF.
2) Both TIMER and OPERATE buttons are ON, and "real time" is within the range set on the timer.

2. Initial operations after power ON

1) In absence of a cassette, all mode indicators are OFF and the signal system enters the E-E (electric-to-electric) mode.
2) With a cassette present, if both the cassette load end switch and the eject end switch are off, the Eject mode is entered.
3) When the mechanism is in modes other than Stop, after unloading mode is entered.

3. Power OFF

In the power OFF state, the front panel OPERATE button indicator is extinguished and all operations, including cassette insertion and removal, are inhibited. The power OFF state is attained by:

1) Setting the front panel OPERATE button to OFF or setting power off from the remote control unit. In modes other than Stop, unloading is performed, then the power OFF state entered.
2) Setting the front panel TIMER button to ON. When this is performed during Play or Recording the mechanism first enters Timer Standby, then proceeds to power OFF. During Instant Recording, power OFF is not produced.
3) The above cases apply when the safety tab of the cassette is present. If the tab is absent, the cassette is ejected, then power OFF attained.

4. Cassette housing

1) Cassette loading is performed when the cassette in detect switch closes. At this time, if the switch opens within 0.7 sec, the Eject mode is entered.
2) If the cassette loading operation does not complete within approximately 8 seconds, the Eject mode is entered.
3) If the eject operation does not complete within approximately 8 seconds, the power OFF state is attained.

5. Automatic operations

A] Auto-stop mode entry

1) When beginning of tape is reached in Rewind or Search Reverse mode. The leader portion of the tape is detected, at which time the tape is transported in the forward direction until the leader tape clears the detector, then the Stop mode is entered.
2) Tape memory switch ON in Fast Forward or Rewind mode, and the tape counter reaches "0000" indication.
3) If the Pause/Still mode continues for longer than 5 minutes 25 seconds.
4) During Play, Recording or Search Forward mode, if the take-up reel disk rotation stops for longer than approximately 3 seconds.
5) In Search Reverse, Fast Forward or Rewind mode, if either the take-up or supply reel disk rotation stops for longer than about 3 seconds.
6) Drum motor rotation stops for longer than approximately 2 seconds in the Play, Record, Pause, Still or Search mode.
7) Loading operation does not complete within about 8 seconds after starting.

B] Auto-Eject mode entry

1) When end of tape is reached in Timer Recording or Instant Recording mode. After Eject, power is switched off.
2) During cassette loading, after cassette in detect switch closes, if the switch does not open within approximately 0.7 second.
3) If cassette loading operation does not complete within about 8 seconds.
4) Start and end sensors activated simultaneously.
5) Cassette safety tab absent and Timer or Instant Recording selected. If Timer Recording, after Eject, power is switched off.

C] Auto-Rewind mode entry

At end of tape in the Play, Record, Search Forward or Fast Forward mode.

D] Automatic Recording mode entry

Two seconds prior to programmed time for Timer Recording.

E] Automatic power ON or OFF

1) Ten seconds prior to the start of Timer Recording, power is switched on; at the end of Timer Recording, power is switched off.
2) In event of commercial power loss, at the return of power, unloading is performed and power switched off, regardless of the OPERATE and TIMER button settings. If this occurs during Timer Recording, unloading is performed, then the Recording mode is entered.
3) If Eject operation does not complete within approximately 8 seconds, power is switched off.
4) At completion of Instant Recording, unloading is performed, then power switched off.
5) When end of tape is reached in Timer or Instant Recording, Eject is performed, then power is switched off.
6) If the safety tab is absent from the cassette and the TIMER button pressed, Eject is performed then power is switched off.

6. Timer mode

1) Ten seconds prior to Timer Recording, power is switched on and the Pause mode entered. Recording starts two seconds before the programmed time. At completion of the programmed time, the mechanism assumes the Timer standby state and power is switched off. During Timer Recording, all operating (except INSTANT REC) controls are inhibited.
2) If both TIMER and OPERATE buttons are ON, but the safety tab is absent from the cassette, Eject is performed, then power is switched off.
3) During Timer Recording, if the OPERATE or TIMER button is set to OFF, unloading is performed and the power is switched off. The timer program for this particular event becomes erased.
4) At end of tape in Timer Recording, Eject is performed and power switched off. The timer program for this particular event becomes erased.

7. Instant Recording

1) With OPERATE button ON and safety tab of cassette present, the Instant Recording command is registered regardless of the mode in progress. At completion of Instant Recording, unloading is performed and power is switched off. During Instant Recording, the SP/LP select and STOP buttons are enabled.
2) During Instant Recording, if the OPERATE button is set to OFF, unloading is performed and power is switched off. If the end of tape is reached, Eject is performed and power is switched off.
3) If the safety tab is absent from the cassette and the Instant Recording button pressed, Eject is performed.

1.2.2 Switches and sensors

1. REC SAFETY switch
   This switch, built into the cassette housing detects the presence or absence of a cassette's tab for erase protection. When a tab exists, the switch turns on. In case this switch is in OFF, the machine doesn't enter REC or REC PAUSE mode.
2. CASSETTE-IN DETECTOR switch
   Two cassette-in detector switches detect if a cassette is inserted.
3. CASSETTE LOAD END switch
   This detects the cassette housing in the lower state.
   When this switch is turning on, the cassette housing is fixed by the torsion spring.
4. EJECT END switch
   This detects the cassette housing in the up state.
   When this switch is turned on, the cassette is completely ejected from the machine.
5. START sensor
   This detects the leader tape portion of a cassette tape.
   When the leader tape is detected, this sensor turns on.
6. END sensor
   This detects the trailer portion of a cassette tape.
   When the trailer tape is detected, this sensor turns on.
7. TAKE-UP REEL sensor
   This detects rotation of the take-up reel disk.
8. SUPPLY REEL sensor
   This detects rotation of the supply reel disk.
9. LOADING sensor
   A sensor for setting a mode of the mechanism.

Table 1-2-1 shows the allowed shifts from a mode in progress to another mode.

MODE / KEY	STOP	PLAY	STILL	FF	REW	REC	REC + PAUSE	A. DUB + PLAY	A. DUB + PAUSE	INSTANT REC	TIMER REC
STOP		○	○	○	○	○	○	○	○	○	×
PLAY	○		○	○	○		○ (REC PLAY)		○ (A. DUB PLAY)	×	×
PAUSE → STILL	×	○	○ (FADV)	×	×	○ (REC PAUSE)		○ (A. DUB PAUSE)	○ (FADV)	×	×
FF	○	○ (S. FF)	○ (S. FF)		○	×	×	×	×	×	×
REW	○	○ (S. REW)	○ (S. REW)	○		×	×	×	×	×	×
REC + PLAY	○	○	○	○	○		○	○	○	×	×
REC + PAUSE	○	○	○	○	○	○		○	○	×	×
A. DUB + PLAY	○	○	○	○	○	×	×		○	×	×
A. DUB + PAUSE	○	○	○	○	○	×	×	○		×	×
EJECT	○	○	○	○	○	×	×	×	×	×	×
INSTANT REC	○	○	○	○	○	○	○	○	○	○ (*1)	○
CH. UP / DOWN	○	×	×	○	○	×	○	×	×	×	×

Notes:

○ : Enabled (mode changes)
× : Inhibited (mode does not change)
* 1 : Rec time advance

Table 1-2-1 Mode shift table

1.3 TIMER CONTROL OPERATIONS

Item	Conditions	Displays and Operations
1. Display of Power Failure	1) In the conditions of: AC - IN Mains Power Switch - ON OPERATE button - OFF 2) In the condition of 1) above: OPERATE button - ON TIMER button - ON	" SUN " CLOCK 0:00 is displayed and all figures (showing time) blink. Does not release 'Power Failure Display'.
2. Clock Setting	1) In the condition of: Mains Power Switch - ON, CLOCK ADJ. button pressed with OPERATE button - ON and TIMER button OFF. 2) CLOCK ADJ. button and DAY button are simultaneously pressed. 3) CLOCK ADJ. button and HOUR button pressed simultaneously. 4) CLOCK ADJ. button and MIN (+) or MIN (−) button pressed simultaneously. 5) Setting order of DAY, HOUR, MIN (+) or MIN (−) 6) Automatic advancement (setting back minute)	Releases 'Power Failure Display'. (Blinking of figures stops.) " SUN " CLOCK 0:00 displayed. On the display the day of week changes one after another, with every pressing of the DAY button. ↱ SUN → MON → TUE → WED → THU → FRI → SAT ↰ On the display, figure(s) showing the hour advances with every pressing of HOUR button. (DAY display does not change.) ↱ 0 → 1 → 2 → . . . . . 21 → 22 → 23 ↰ Figure(s) displaying minute increases or decreases with every pressing of MIN (+) or MIN (−) button. (Figure[s] showing HOUR does not change.) ↱ 00 ⟷ 01 ⟷ 02 ⟷ 03 . . 57 ⟷ 58 ⟷ 59 ↰ Any button is operative without regard to other displays. Depressing DAY, HOUR or MIN (+) button for 1 and more second (s) advances related display +1. (MIN [−] is the same for setting back.)
3. Program Setting	1) PROGRAM button is pressed once at the present time diaplay. 2) START button is pressed in the condition of above 1). 3) DAY, HOUR, MIN buttons pressed in the above condition 2). 4) In the case START (switch-on time) is not yet set is the condition of the above 1). 5) STOP button is pressed in the condition that START has been set. 6) In the case both START and STOP have been set.	Displays as follows: 1st SUN REC SP START − − : − − STOP − − : − − PROG − − 1 or Displays the contents of the program No. 1 pre-set. *If status is held for longer than approximately 1 minute, the present time indication is returned. "START" blinks on the display. Displayed figure(s) corresponding to the pressed button increases or decreases. (DAY of the program changes as follows:) ↱ 1st SUN → 1st MON →--→ 1st SAT → 2nd SUN → -- ↰ SUN ~ SAT ← 2nd SAT ← Impossible to set STOP (switch-off time). If STOP has not been set ("− − : − −" is displayed), the time of START is copied and "STOP" on the display blinks. "STOP" on the display blinks.

Item	Conditions	Displays and Operations
	7) DAY, HOUR and MIN buttons pressed in the condition of 5) and 6) above.	Displayed figure(s) corresponding to the button(s) pressed increases or decreases.
	8) CH button pressed.	"PROG" on the display blinks.
	9) In the condition that "PROG" on the display is blinking: CH UP/DOWN buttons pressed.	Figure(s) dispalying channel No. increased or decreases.
	10) SP/LP button is pressed in the condition of 1) above. (Selection of REC mode)	"SP" or "LP" is alternately displayed every pressing of the button.
	11) REPEAT button pressed.	"REPEAT" lights on the display or turns off.
	12) CANCEL button pressed.	All displays are set back to the initial stage respectively.
	13) PROG button pressed in the condition of 1) through 11) above.	Displays contents of the program next to the program No. displayed just before the switching.
4. Programmable Timer Recording	1) OPERATE button - OFF and TIMER button - ON in the condition that a cassette with safety tab is loaded and a (and more) program(s) is correctly set.	"TIMER" on the display blinks as far as the condition 1) left continues. No recording of the program.
	2) Both OPERATE button and TIMER button are OFF in the same condition as 1) above.	"TIMER" on the display does not light nor blink. No recording of the program.
	3) Both OPERATE button and TIMER button are ON in the same condition as 1) above.	"TIMER" lights on the display and figure(s) equivalent to the program(s) possible record also lights. Example:
	4) In the case of 3) above, the program starts being recorded 10 seconds before the set time.	POWER automatically turns on (PRE-START output is output by the timer). REC mode of SP or LP is selected according to the program.
	5) For the period of 8 seconds from the condition 4) above to 2 sec before the start.	The machine enters REC PAUSE mode. Display of the program No. to record changes from lighting to blinking.
	6) In the condition of 3) above, it is 2 sec before (−2 sec) the set start time.	PAUSE mode is released and the tape starts running. (REC START output is turned out by the timer.)
	7) Through the period from START − REC − to END in the condition of 3) above.	The program No. under recording blinks on the display.
	8) Time is up to the ending time set for the program.	Recording stops. (REC START OFF signal is turned out by the timer.)
	9) In the case the following program is recorded in the above manner (up to 8)). (1) Program is Not REPEAT DAILY.	(1) The machine turns back to the initial stage after recording is completed. At the same time the recorded program No. that has blinked on the display turns out.
	(2) Not REPEAT but DAILY.	(2) After completion of recording the day of week that the recording was performed is deleted from the program.
	(3) REPEAT.	(3) After completion of recording the program No. of the recorded one continues lighting on the display. There are no changes in the contents of the program.

Table 1-3-1 Timer operations

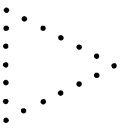
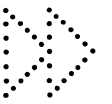
Item	Conditions	Displays and Operations
5. Counter Display	1) OPERATE button - ON OPERATE button - OFF	COUNTER display lights. COUNTER display turns off.
	2) COUNTER RESET button pressed once while COUNTER is displaying.	COUNTER is forcibly set to "0000".
	3) COUNTER RESET button pressed once while COUNTER is not displaying.	COUNTER does not be set to "0000" forcibly.
	4) FF or REW button pressed while TAPE MEMORY switch is ON.	COUNTER resets the value "0000 ±2" and stops operation. (COUNT 0 signal is turned out of the timer.) Reset in FF : in the range of 0000–0002 REW : in the range of 0000–0009
	5) FF or REW button pressed while TAPE MEMORY switch is OFF.	After COUNTER reads "0000" the operation mode continues.
	6) RESET button pressed in the state of 4) above.	COUNTER is forcibly reset to "0000" and tape running stops.
	7) COUNTER/LAP button pressed once while COUNTER is displaying numbers.	Display changes from "COUNTER XX XX" to "LAP X:XX".
	8) After the process of 7) above, COUNTER/LAP button pressed once again.	Display changes from "LAP ....." to "COUNTER .....".
	9) COUNTER value goes UP or DOWN regardless COUNTER display.	
6. LAP indication during recording	1) OPERATE button ON	"Counter XXXX" displayed
	2) During counter indication, COUNTER/LAP button pressed	LAP 0:00 is displayed
	3) Set for Recording mode	Elapsed time since start of recording indicated in minutes (seconds not displayed)
	4) From above (3), set for Pause mode	LAP display stops; count continues when recording mode is returned.
	5) From above (3), set for Stop mode	Elapsed time since start of recording remains displayed. Pressing the COUNTER RESET button returns the display to 0:00.
	6) During LAP indication, press the COUNTER/LAP button	Counter display is returned.
7. Instant Recording	1) INSTANT REC button pressed once while OPERATE button is ON.	Display of "COUNTER ..." or "LAP ..." changes to "REC STOP ––:––", and REC STOP light blinks. Channel switching becomes possible.
	2) The machine is left in the condition of 1) above for 10 and more seconds.	"REC STOP––:––" display changes "COUNTER display".
	3) INSTANT REC button pressed once again after the process 1) above.	"REC STOP 0:30" display appears and the machine enters REC mode.
	4) INSTANT REC button pressed several times after the process 3) above.	Displayed time advances 30 minutes by 30 minutes every pressing of the switch. Example: 0:30 → 1:00 → ····· → 4:00 ···· → 0:00 ←
	5) HOUR and MIN buttons pressed in the state of 3) above.	Time setting on a unit of 1 minute is possible. (Max. 4 hours 59 minutes)
	6) When "REC STOP 0:00" is displayed.	Recording is completed 10 seconds after the display. At the same time power turns off and "REC STOP 0:00" display disappears.

Item	Conditions	Displays and Operations
	7) OPERATE button is turned on and a cassette with safety tab is loaded.	By pressing INSTANT REC button the machine enters INSTANT REC mode.
	8) OPERATE button is set to ON but there is no power for operation.	By pressing INSTANT REC button operative power comes and the machine enters INSTANT REC mode.
	9) When a cassette without safety tab is loaded and OPERATE button is ON.	Pressing INSTANT REC button does not enter the machine into INSTANT REC mode but ejects the cassette.
	10) Without any cassette loaded.	Pressing INSTANT REC button does not enter the machine into INSTANT REC mode.
8. Others	1) CLOCK button pressed while PROG-GRAM is displayed.	Display changes to CLOCK display.
	2) REC SELECT switch is set to TV and OPERATE button is ON.	Pressing CH UP/DOWN button changes displayed channel No. up or down.
	3) DIMMER button pressed.	Overall FDP brightness dims. Again pressing the button restores the original brightness.
	4) IC1 of timer circuit set for test mode (TP2 grounded)	Operation can be performed at 16 times normal rate.

Table 1-3-1 Timer operations

1.4 SYMBOLIC MODE INDICATORS

The fluorescent display panel indicates the operating modes by using the symbols outlined in the following table.

Mode in Progress	Conditions	Displays and Operations
1. STOP	1) Mains power ON	
	2) OPERATE button ON	No symbolic indication
	3) Cassette tape inserted	No symbolic indication
2. PLAY	1) PLAY button pressed	
3. FAST FORWARD	1) FF button pressed	
4. REWIND	1) REW button pressed	

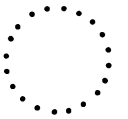
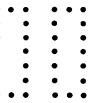
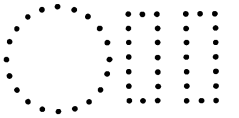
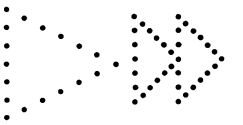
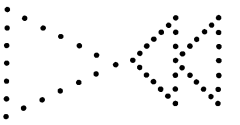
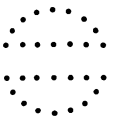
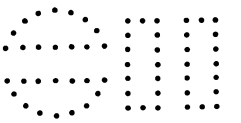
Mode in Progress	Conditions	Displays and Operations
5. RECORD	1) REC and PLAY buttons pressed simultaneously	 (Circle is red color)
6. STILL	1) Entered from Play mode 2) STILL button pressed	
7. REC PAUSE	1) REC and PAUSE/STILL buttons pressed simultaneously	 (Circle is red color)
8. SEARCH FF (Forward Search)	1) Entered from Play mode 2) FF button pressed	
9. SEARCH REW (Reverse Search)	1) Entered from Play mode 2) REW button pressed	
10. AUDIO DUB	1) AUDIO DUB and PLAY buttons pressed simultaneously	 (Circle is red color)
11. AUDIO DUB PAUSE	1) Entered from Audio Dub mode 2) PAUSE/STILL button pressed	 (Circle is red color)
12. Others	DIMMER switch ON/OFF	Symbolic mode indicators shall be nearly the same brightness as the clock indicators. Shift between modes shall be smoothly conducted. Dimmer operation shall be at the same timing as the clock indication.

Table 1-4-1 Symbolic mode indicators

SECTION 2
MECHANICAL ADJUSTMENTS

2.1 GENERAL

2.1.1 Precautions

- IMPORTANT

1. Disconnect from power before removing or soldering components.
2. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require re-adjustment.
3. Tighten the screws carefully to avoid damage to the chassis.

Test equipment required :

Color television or monitor
Oscilloscope : wide-band, dual trace, triggered, delayed sweep
Recording tape
Alignment tapes : MH-2 and MH-2L

2.1.2 Required test equipment, jigs and tools

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary, resulting in possible damage. In addition, general-purpose tools and a metric hex key (obtain locally) are required.

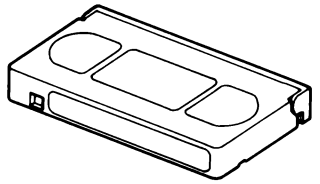
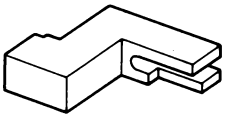
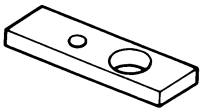
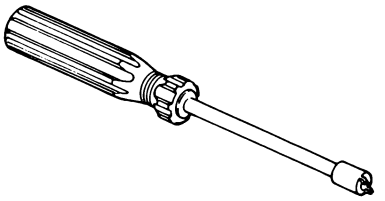
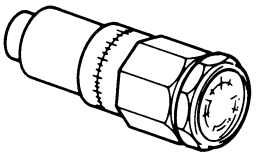
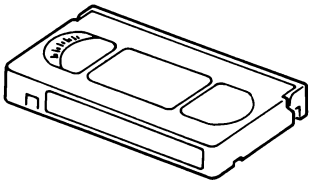
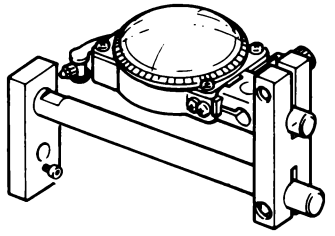
JVC alignment tape MH-2/MH-2L 	Height gauge PUJ44904-2 	Spacer PUJ44905 (for micro-checker) 
Tapered nut driver PUJ50637 	Torque gauge ass'y PUJ48075-2 	Back tension cassette gauge PUJ48076 
Micro-checker PUJ49712-2 		

Table 2-1-1 Jigs and tools

Note: See section 3.2 required test equipment and jigs regarding electrical adjustments.

2.1.3 Disassembly

1. Top cover and bottom plate

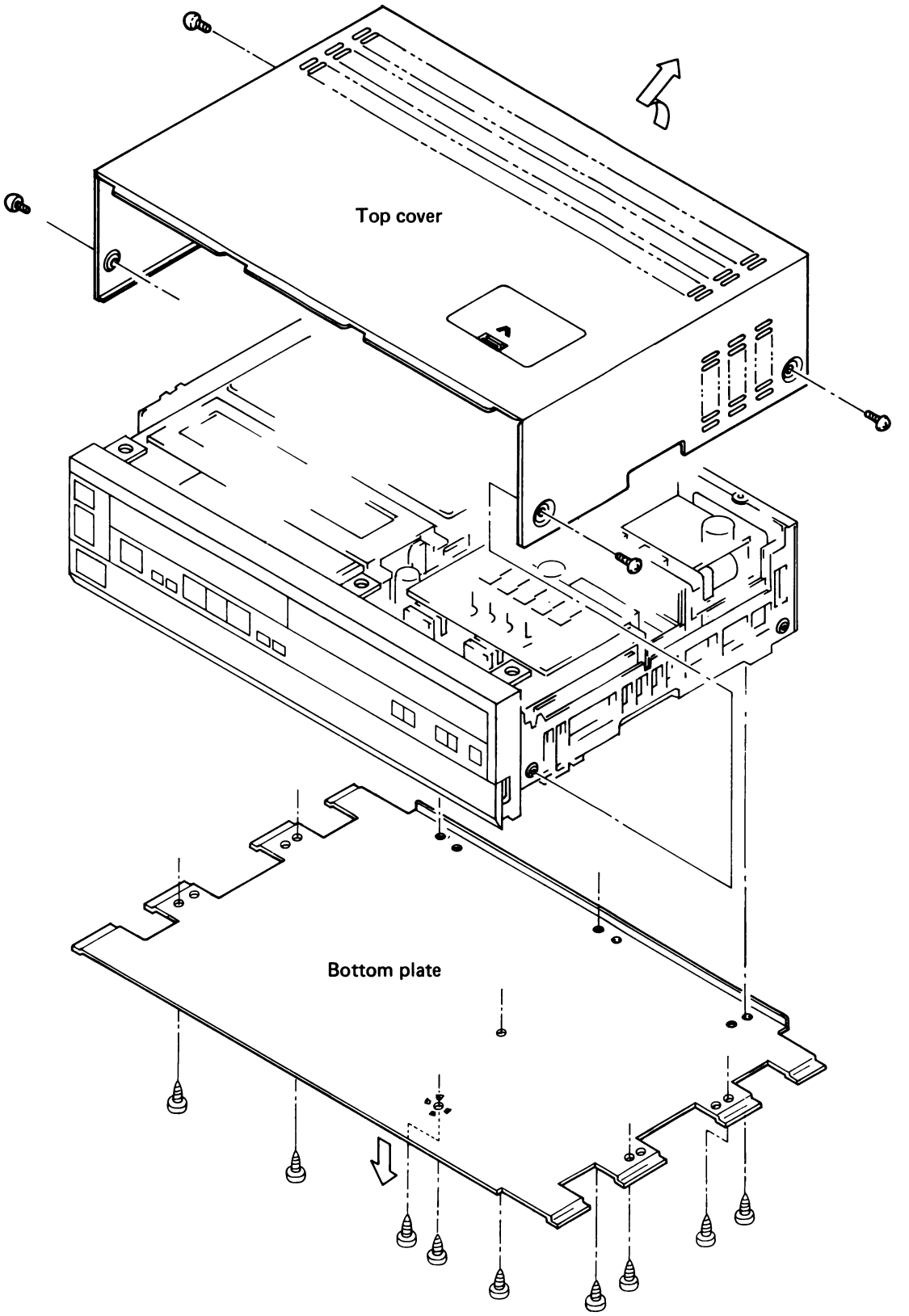


Fig. 2-1-1 Top cover/bottom plate

2. Front panel and rear panel

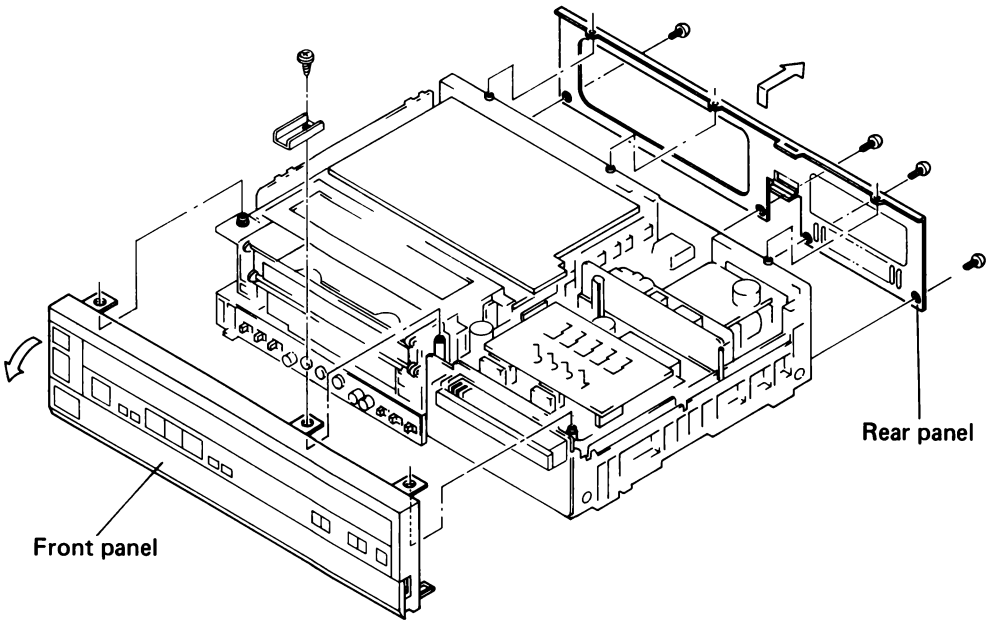


Fig. 2-1-2 Front panel/rear panel

3. Cassette doors

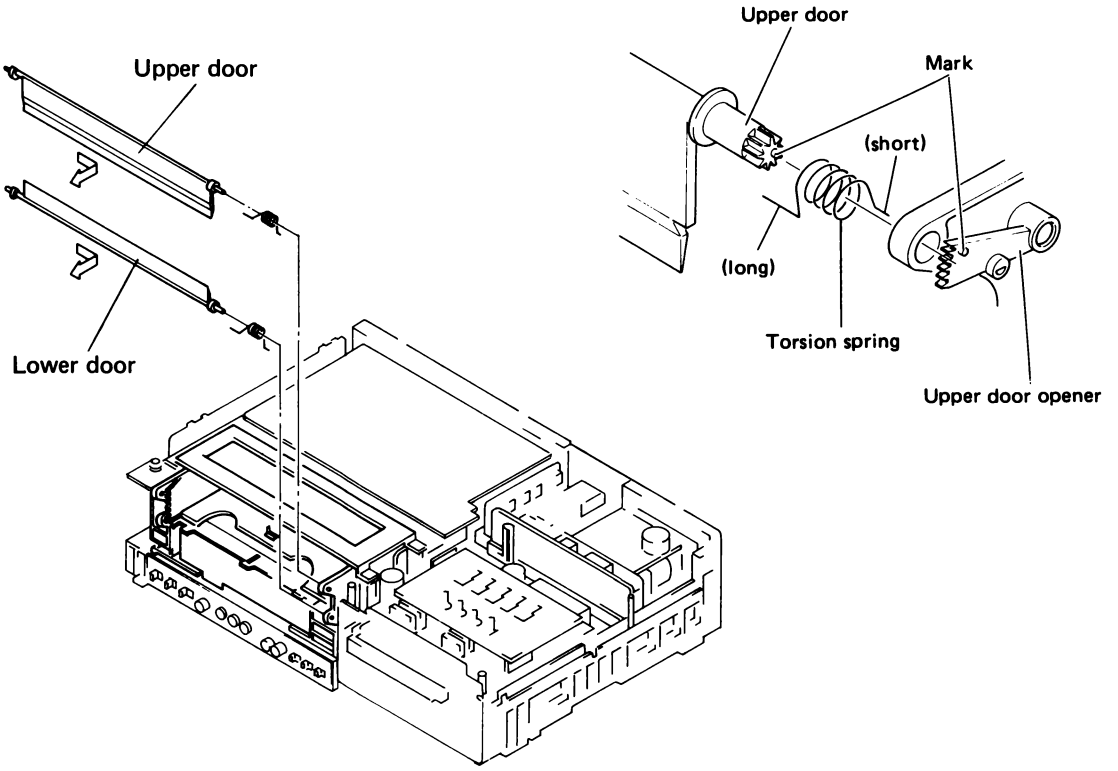


Fig. 2-1-3 Cassette doors

Notes:

When reassembling the doors, proceed as follows:

1) Locate the mark on the gear portion of the upper door.
2) Set the long straight part of the torsion spring toward the upper door.
3) Install the upper door so that the mark noted in Step 1) is aligned with the mark on the upper door opener of the cassette housing.

2.2 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

2.2.1 Layout of maintenance parts

1. Top view

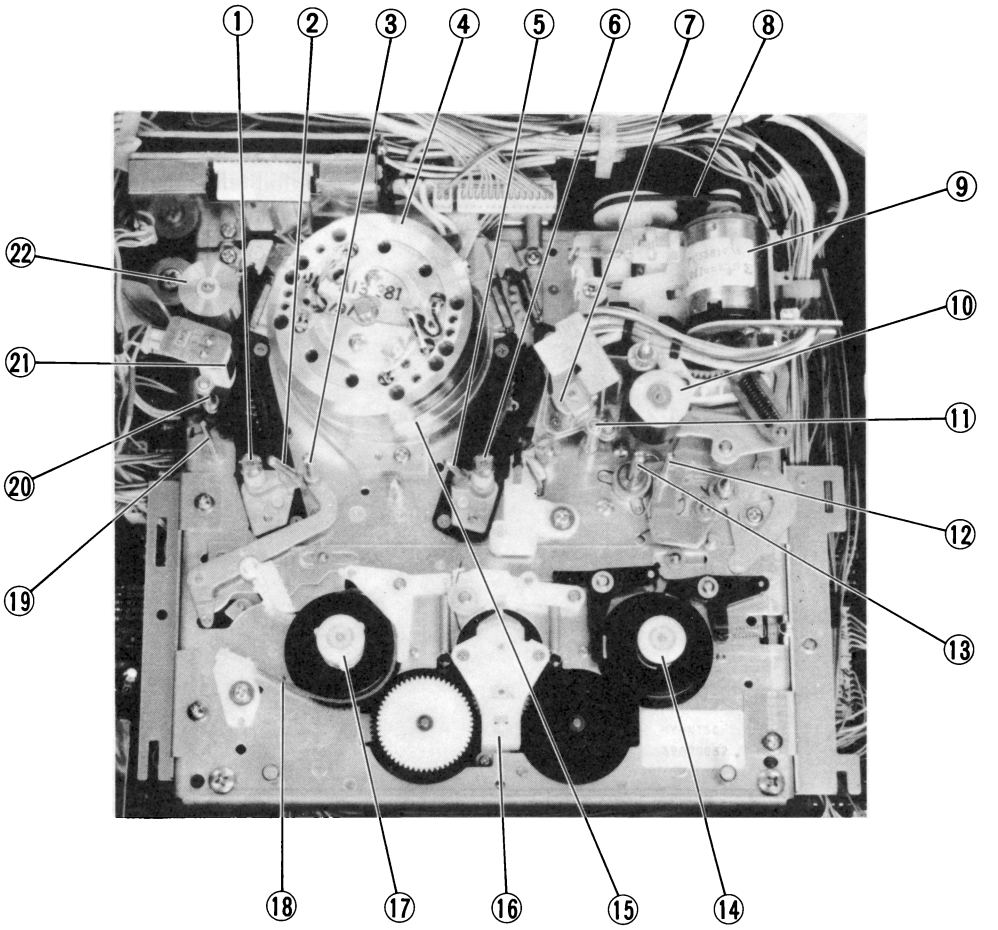


Fig. 2-2-1 Top view

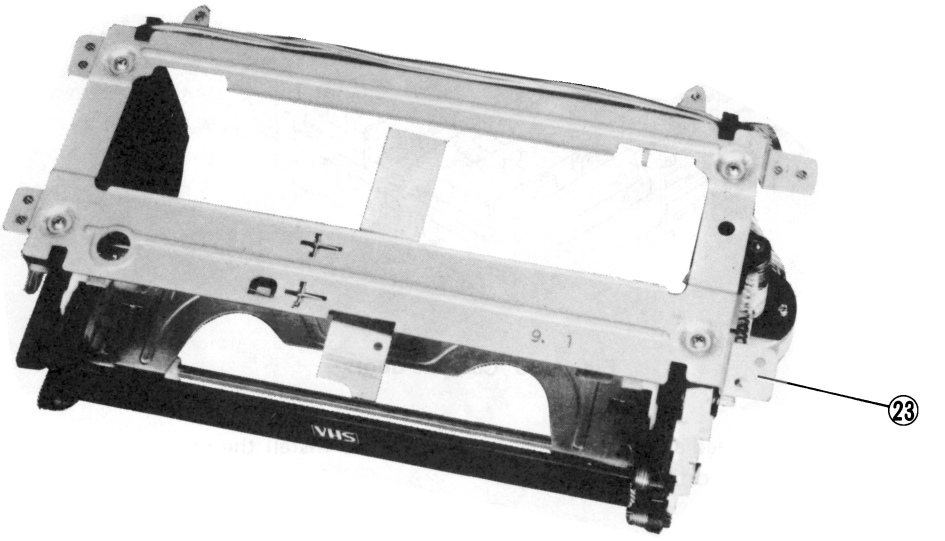


Fig. 2-2-2 Cassette housing

2. Bottom view

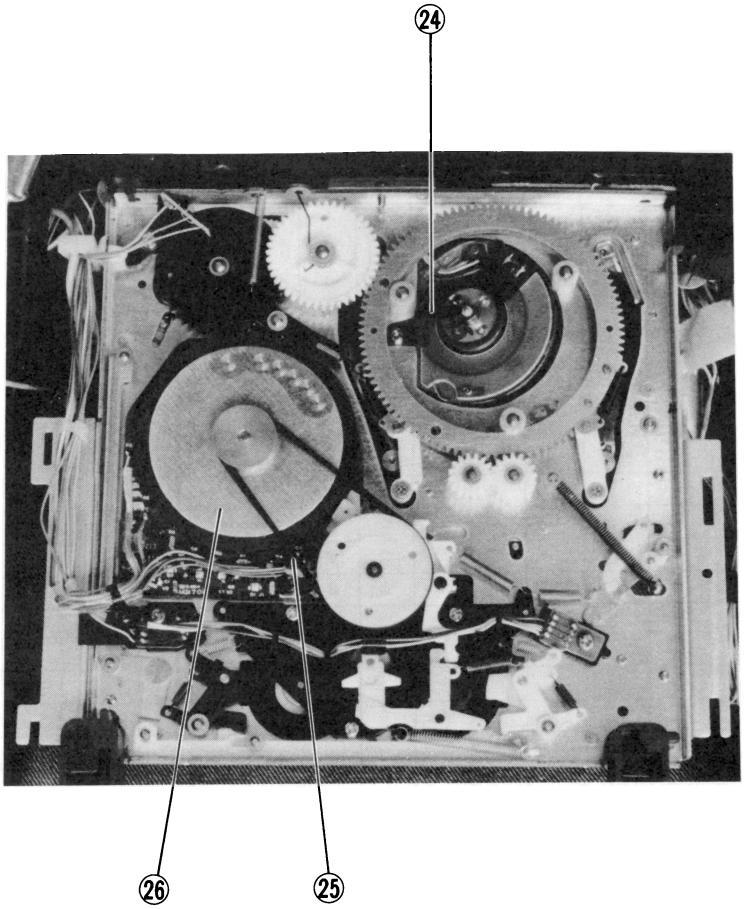


Fig. 2-2-3 Bottom view

1 SUP guide roller
2 SUP slant pole
3 Tension pole
4 Upper drum
5 T.U. slant pole
6 T.U. guide roller
7 Audio/Control head
8 Loading belt
9 Mode control motor
10 Pinch roller
11 T.U. guide pole
12 Guide arm
13 Capstan
14 T.U. reel disk
15 Lower drum
16 Clutch mechanism
17 SUP reel disk
18 Tension band
19 SUP guide pin
20 SUP guide pole
21 Full erase head
22 Impedance roller
23 Cassette motor
24 Brush
25 Reel belt
26 Capstan motor

2.2.2 Service schedule for main components

The following table lists the parts which should receive periodic servicing at the recommended intervals.

	Part Name	Replacement Part No.	Periodic Service Schedule (Operating Hours)										Reference Section	Remarks
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000		
Tape transport system	Tension pole SUP slant pole SUP guide roller SUP guide pin SUP guide pole Impedance roller TU guide pole Capstan Guide arm TU guide roller TU slant pole Lower drum		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		• For cleaning, use a lint-free cloth or gauze dampened with alcohol. • After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.
	Upper drum		☆	○	●	☆	○	●	☆	○	●	☆	2.3.2	— When cleaning the head tips on the upper drum, do not clean them with a vertical stroke. Use only a gentle back and forth motion in the direction of the tape path.
	Full erase head		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.3	
	Audio/control head		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.4	
	Pinch roller		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.5	
Drive system	Capstan motor											○	2.3.6	
	Reel belt			☆		●		☆		●		☆		
	Mode control motor											○	2.3.7	
	Mode CTL belt			☆		●		☆		●		☆		
	Cassette motor											○	2.3.8	
	SUP reel disk					△				△		○	2.3.9	— Do not over lubricate.
	TU reel disk													
	Clutches			○		○		○		○		○	2.3.10	— Torque check (refer to section 2.4.3).
Others	Brush		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.11	
	Tension band			○		○		○		○		○	2.3.12	— Back tension check (refer to section 2.4.4)

☆ Cleaning ● Replacement △ Lubrication ○ Check and Replace if necessary.

Table 2-2-1 Standard service periods

Above replacement times will vary greatly according to environmental and usage conditions. Routine inspection and maintenance are also important factors that influence the unit life. Note that rubber parts may become aged or deformed after long periods of storage, even if the unit is not used.

Notes:

1) Even if the unit is not used frequently, cleaning, lubrication and replacement of the belts should be undertaken every 2 years.
2) Refer to Section 5 Parts List regarding replacement parts of Table 2-2-1. Note that Part numbers are subject to change without prior notice.

2.3 MAIN ASSEMBLY REPLACEMENT

Remove the external covers and the circuit boards, as necessary, to allow replacement.

2.3.1 Cassette housing

- Removal of cassette housing

1. Disconnect connector CN1, coming from A/S/M board, from CASS. HOUSING board.
2. Take out four screws (1) and remove the earth plate.
3. Carefully lift the cassette housing upwards to remove it.

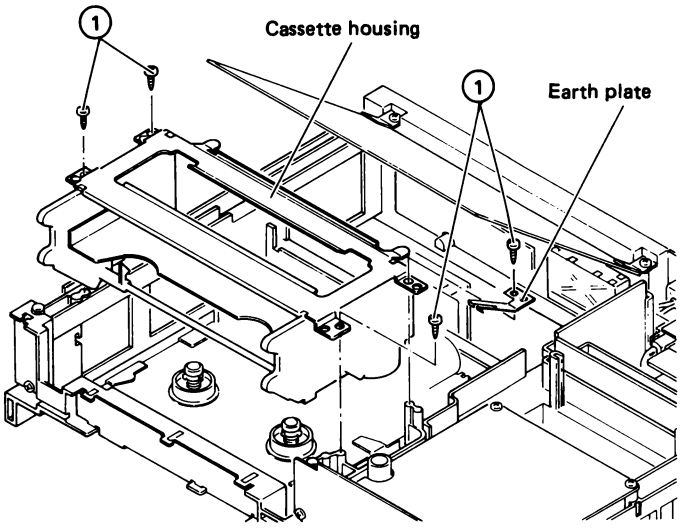


Fig. 2-3-1 Removal of cassette housing

- How to operate the set without loading a tape

For service procedures that call for operation of the set without loading the tape around the head drum, extract the cassette housing from the interior of the set and position it as described below.

1. Set a sheet of insulated material (cardboard, plastic, etc.) on the right side of chassis, above the Timer board.
2. Remove the cassette housing from the interior of the set and place it on the insulated sheeting, but do not disconnect the connector from the A/S/M board.
3. Insert a cassette into the cassette housing. The housing mechanism functions to retract the cassette.
4. Since the required sensors are contained within the housing, after the cassette has been retracted, the desired modes can then be obtained by using the operation switches.

CAUTION: To protect the costly Alignment Tape from accidental erasure or over-recording, remove (break off) the REC Safety tab of a dummy cassette and insert this into the cassette housing. The REC Safety switch of the cassette housing responds to the presence or absence of the tab of the cassette. When present, the machine can enter the Recording mode.

2.3.2 Upper drum

1. Unsolder the eight wires connecting the lower drum from the relay pins of the upper drum (perform quickly to avoid damaging the wires).

Relay Pin Color	Channel	Inner/Outer Wire Color
Brown	SP, CH-1	Brown/Green
Red	SP, CH-2	Red/White (clear)
Blue	LP, CH-1	Blue/Black
Orange	LP, CH-2	Orange/Yellow

Table 2-3-1 Upper drum wiring

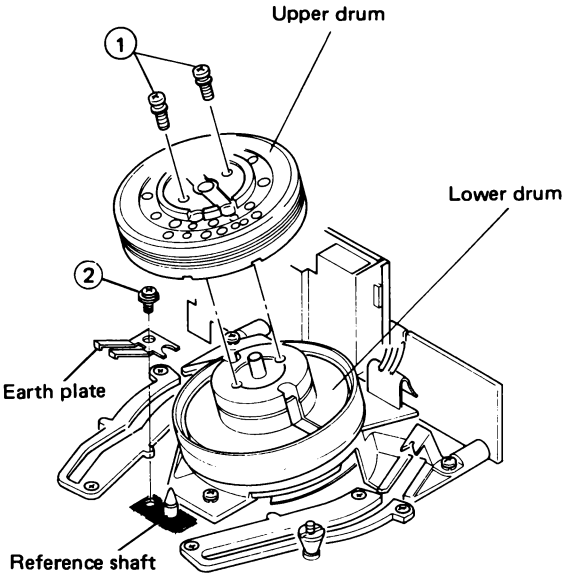


Fig. 2-3-2 Upper drum replacement

2. Take out two screws (1) and remove the upper drum in the upward direction.
3. Use alcohol to clean the lower face of the new upper drum and the upper face of the lower drum. When handling and installing the new upper drum, avoid directly touching the head tips and use care not to scratch the drum.
4. Reassemble by reversing the above steps. When resoldering, observe the correct channels (refer to Table 2-3-1) and avoid overheating the wires.
5. Perform the upper drum eccentricity adjustment.
   1) Supply power and set for the Play mode without a cassette housing (refer to section 2.3.1). After completion of loading, disconnect from power.
   2) Take out screw (2) and remove the earth plate. Set the micro-checker on the reference shaft as shown in Fig. 2-3-3. Use the accessory hex wrench (metric) to tighten the fixing screw.

CAUTION: The micro-checker is a test jig for measuring eccentricity of the upper drum. When using this jig, observe the following precautions.

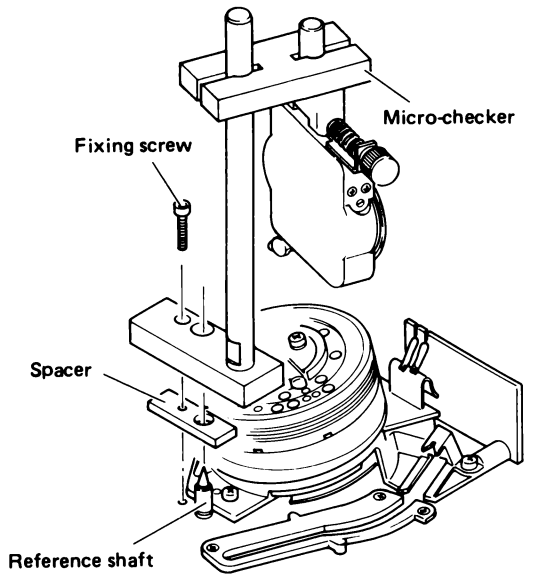


Fig. 2-3-3 Micro-checker mounting

- **As the instrument is extremely precise, use special care not to drop it or subject it to strong vibration.**
- Do not apply strong force to the test probe (Fig. 2-3-4).
- The outer frame of the scale can be turned about 7 scale divisions. Do not turn it forcibly (force greater than 300 g-cm).
- **Use care that the jig does not contact the video heads.**
- Before mounting, turn the fine adjust knob counter clockwise (to where the spring tension is no longer felt).
- **Do not apply power while the jig is installed.**

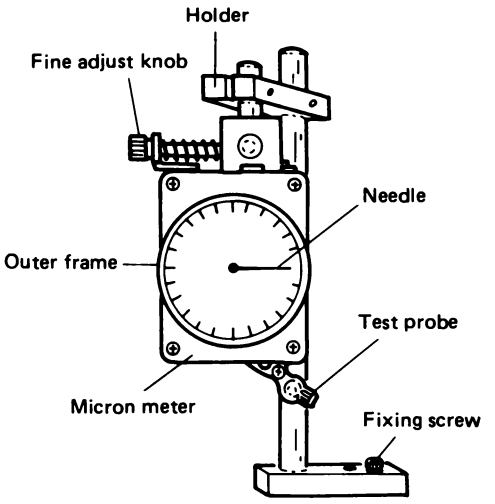


Fig. 2-3-4 Micro-checker

3) Check and readjust the micro-checker position. The correct position is:
   - The test probe contact point is 2 or 3 mm under the top of the upper drum.
   - The test probe movement direction is toward the center portion of the upper drum.
4) Gradually turn the fine adjust knob clockwise so that the test probe contacts the upper drum. The dial indicator registers zero on the scale.
5) While using care not to apply lateral pressure to the upper drum, slowly turn the upper drum and read the deviations indicated by the micro-checker.
6) Check for needle deflection within 4 microns p-p.
7) If deviation is greater than 4 microns p-p, after turning the fine adjust knob counterclockwise to disengage the test probe from the upper drum, loosen two screws ① and carefully readjust the upper drum position, then retighten the two screws in a balanced manner. Repeat above steps 4) to 6).
8) After using, turn the fine adjust knob counterclockwise and remove the micro-checker.
9) Supply power and set for the Stop mode.

6. Perform the interchangeability adjustment (refer to section 2.4.6).

2.3.3 Full erase head

1. Unsolder the two terminals coming from the full erase head and remove the F.E. HEAD board.
2. Take off nut ① and remove the guide pole, guide flanges and coil spring.
3. Unhook the torsion spring from the full erase head arm and remove the full erase head arm in the upward direction.
4. Take out screw ② to remove the full erase head.
5. Replace the full erase head and reassemble by reversing the above steps.
6. Perform the guide pole height adjustment (refer to section 2.4.5).

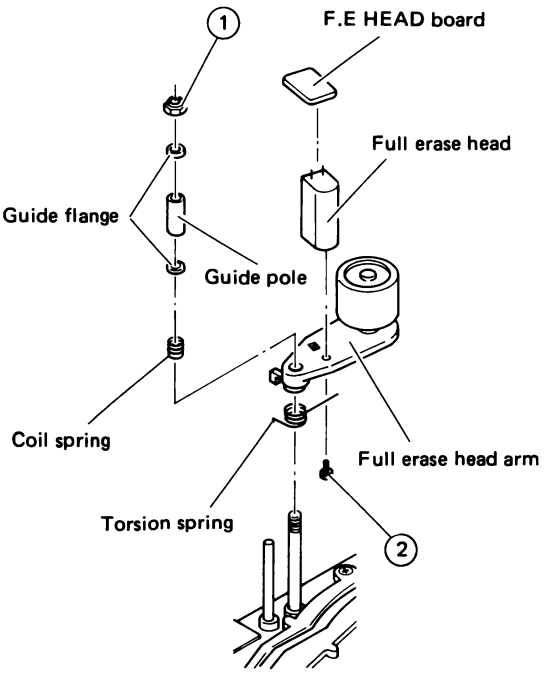


Fig. 2-3-5 Replacement of F.E head

2.3.4 Audio/control head

1. Take out screw ① to remove the bracket and shield cap.
2. Take off nut ②.
3. Unhook the torsion spring from the audio/control head and remove the audio/control head in the upward direction.

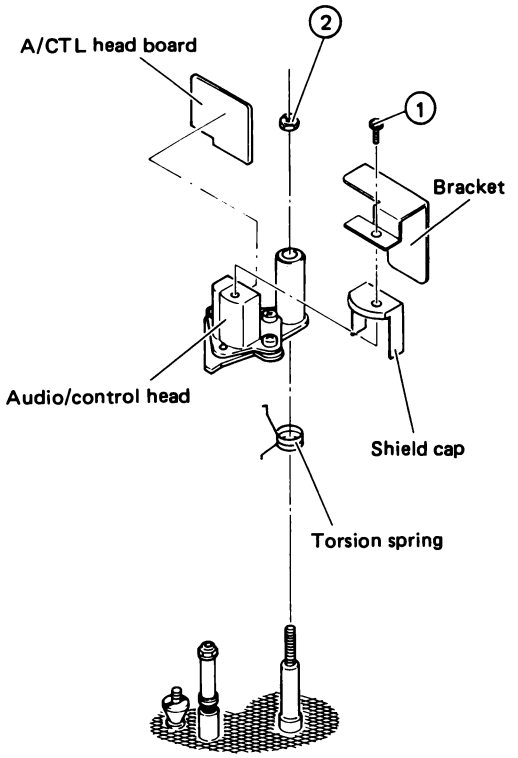


Fig. 2-3-6 Replacement of A/CTL head

4. Unsolder the ten terminals coming from the heads and remove the A/CTL head board.
5. Replace the audio/control head and reassemble by reversing the above steps.
6. Turn the nut and preadjust the audio/control head height as shown in Fig. 2-3-7.

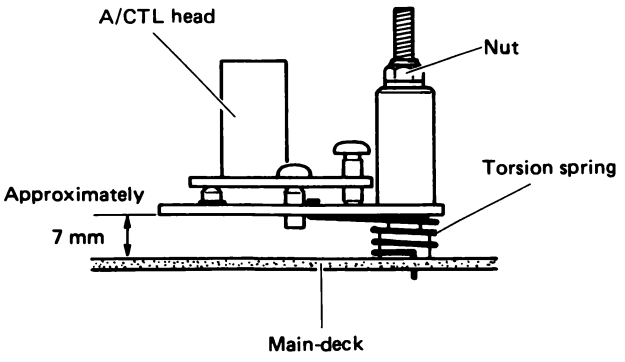


Fig. 2-3-7 A/CTL head height

7. Perform the tape transport/interchangeability checks and adjustments (refer to sections 2.4.5 and 2.4.6).

2.3.5 Pinch roller

1. Take out slit washer ① and slit washer ②, and remove the pinch roller arm in the upward direction.
2. After cleaning the pinch shaft, spread grease on it.
3. Replace the pinch roller arm and reassemble by reversing the above steps. Avoid staining the pinch roller with grease.

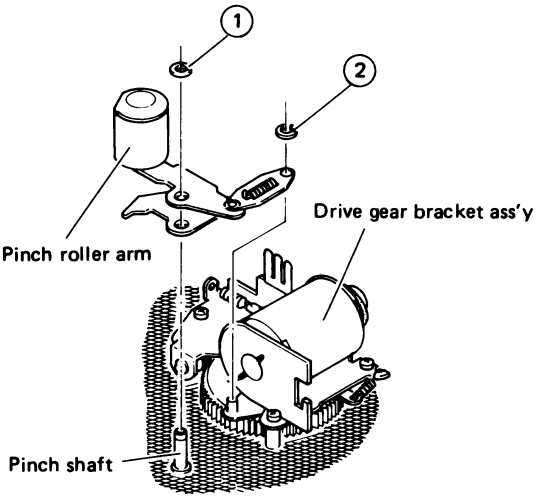


Fig. 2-3-8 Replacement of pinch roller

2.3.6 Capstan motor

1. Disconnect connector CN209 from the A/S/M board.
2. Disengage the motor wires from the clamps and pull out the two cables.
3. Disengage the reel belt from the capstan motor and the pulley of the clutch mechanism assembly.
4. Take out the guide arm and remove the torsion spring from the guide arm.
   Take out three screws ① and remove the capstan motor in the downward direction. Use care regarding the motor brake.
5. Replace the capstan motor and reassemble by reversing the above steps.
6. Perform the capstan DISCR. position adjustment (refer to section 3.5, No. 3).

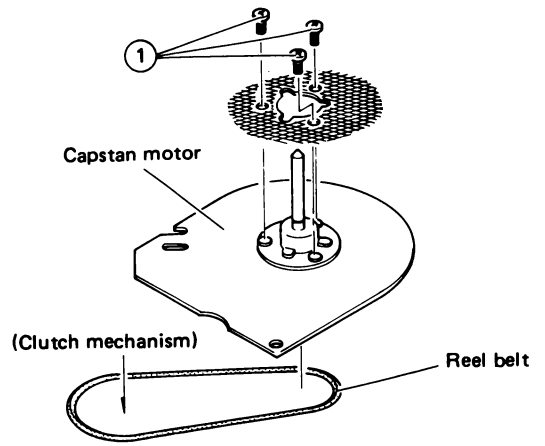


Fig. 2-3-9 Replacement of capstan motor

2.3.7 Mode control motor

1. Unsolder the two terminals coming from the motor and remove the MOTOR board. Use care regarding the clamped wires.
2. Take out slit washer ① and move the slide plate to the side.
3. Take out slit washers ② and ③, remove the cam arm upwards.
4. Take out three screws ④ and remove the drive gear bracket assembly upwards.
5. Disengage the belt, take out two screws ⑤ and remove the mode control motor.
6. Replace the motor and reassemble by reversing the above steps. Remount the motor so that the terminal with the ⊕ mark is soldered to the upper connection on the circuit board, as shown in figure.
7. Perform the loading gear (1) timing check (refer to section 2.4.1).

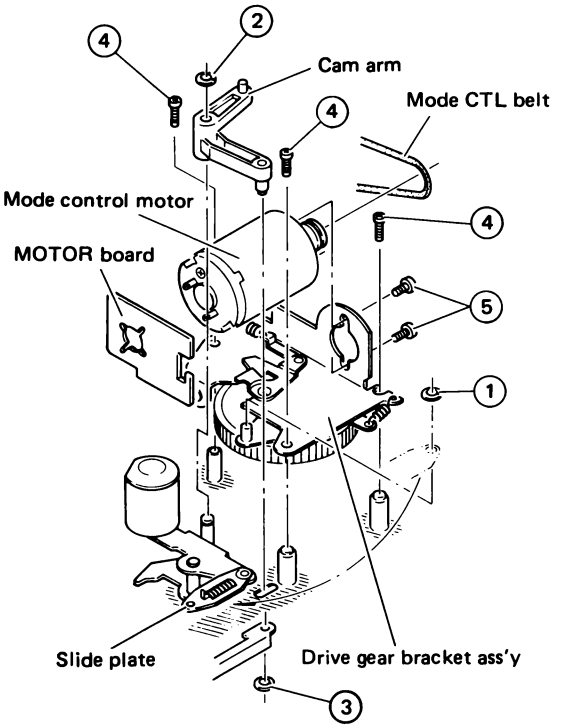


Fig. 2-3-10 Removal of mode control motor

2.3.8 Cassette motor

1. Remove the cassette housing (refer to section 2.3.1).
2. Unsolder the two wires from the cassette motor.

Distinction	Wire Color
Thick boss	White
Thin boss	Gray

Table 2-3-2 Cassette motor wiring

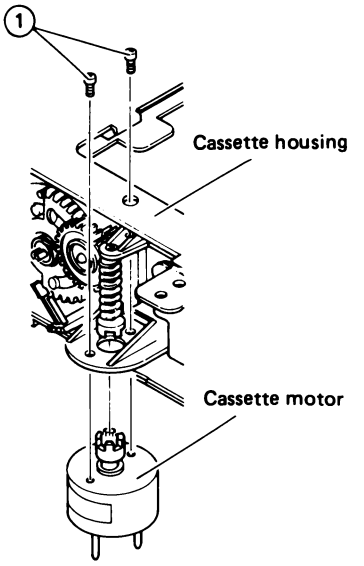


Fig. 2-3-11 Replacement of cassette motor

3. Take out two screws ① and remove the cassette motor.
4. Replace the cassette motor and reassemble by reversing the above steps. Use care regarding the motor wire polarity (refer to Table 2-3-2).
5. Reinstall the cassette housing into its original position.

2.3.9 Reel disks

- Supply reel disk

1. Take out slit washer ① and remove the supply loading brake with spring.
2. Take out screw ② and move the tension band to the side.
3. Take out slit washer ③ and remove the supply reel disk upwards. Use care regarding the washers.

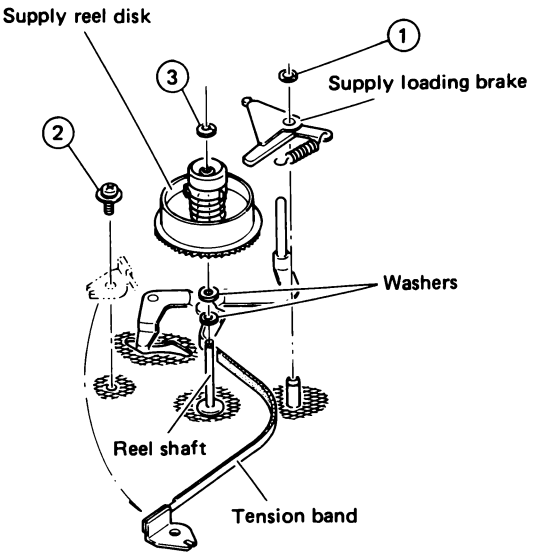


Fig. 2-3-12 Replacement of supply reel disk

4. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
5. Replace and install the supply reel disk, and perform the reel disk height check (refer to section 2.4.5).
6. Mount the tension band and supply loading brake as before, and perform the tension pole position check (refer to section 2.4.2).
7. Perform the back tension check (refer to section 2.4.4).

- Take-up reel disk

1. Take out slit washer ① and remove the search brake with spring.
2. Take out slit washer ② and remove the take-up reel disk upwards while moving the take-up loading brake. Use care regarding the washers.
3. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
4. Replace and install the take-up reel disk, and perform the reel disk height check in the same manner as the supply reel disk (refer to section 2.4.5).
5. Install the search brake as before.

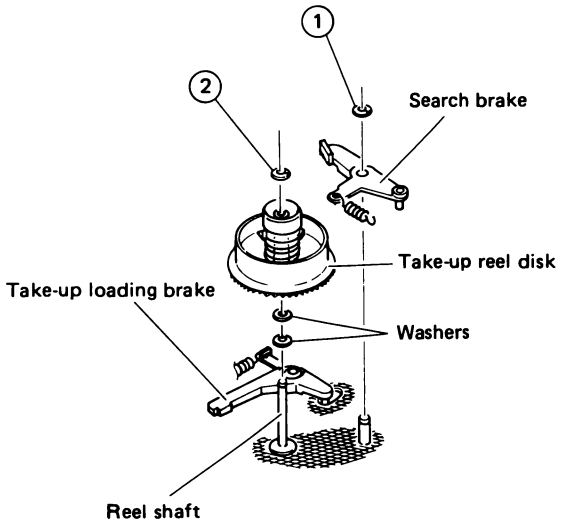


Fig. 2-3-13 Replacement of take-up reel disk

2.3.10 Clutches

- Take-up clutch

1. Remove the take-up reel disk (refer to section 2.3.9).
2. Take out the slit washer and remove the take-up clutch by lifting it upwards. Use care regarding the washer under the clutch.
3. Replace the take-up clutch and reassemble by reversing the above steps.
4. Perform the take-up torque check (refer to section 2.4.3).

- Supply clutch

1. Remove the supply reek disk (refer to section 2.3.9).
2. Take out the slit washer and remove the supply clutch by lifting it upwards. Use care regarding the washer under the clutch.
3. Replace the supply clutch and reassemble by reversing the above steps.

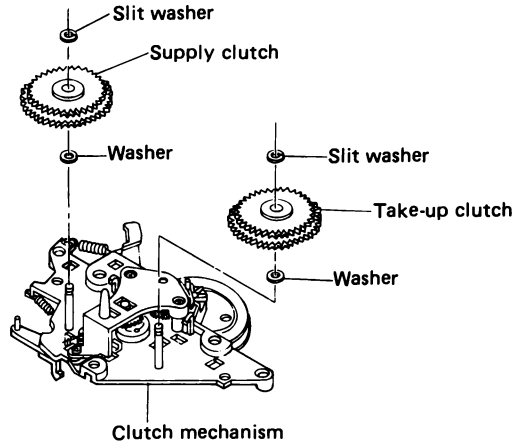


Fig. 2-3-14 Replacement of clutches

- Clutch mechanism

1. Disengage the six springs from the clutch mechanism. These springs come from the supply loading brake, take-up loading brake, main brake slider, supply main brake, take-up main brake and cancel lever.
2. Disengage the reel belt from the pulley of the clutch mechanism.
3. Take out screw ① and remove the supply reel sensor, then unhook the sensor wires from the hooks of the clutch mechanism.
4. Take out three screws ② and remove the clutch mechanism downwards.
5. Replace the clutch mechanism and reassemble by reversing the above steps.
6. Perform the take-up torque check (refer to section 2.4.3).

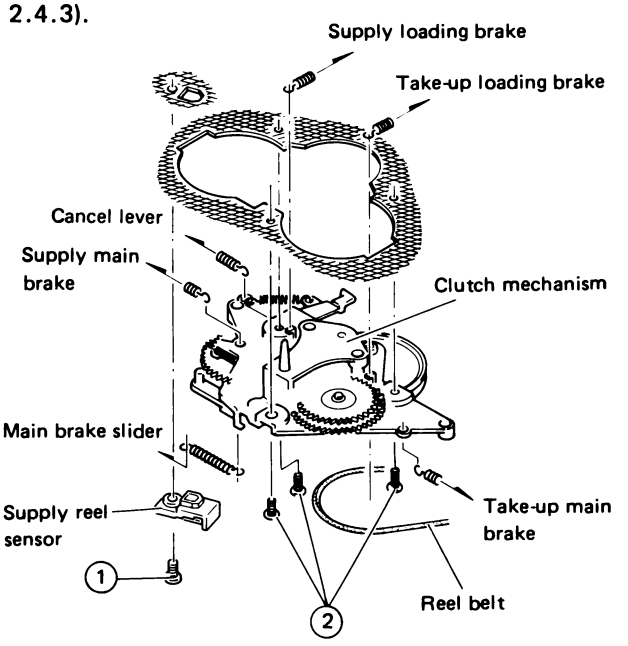


Fig. 2-3-15 Replacement of clutch mechanism

2.3.11 Brush

1. Take out screw ① and remove the brush, and clean the commutator with alcohol.
2. Replace and install the brush as before, check that the brush contacts the center of the commutator.

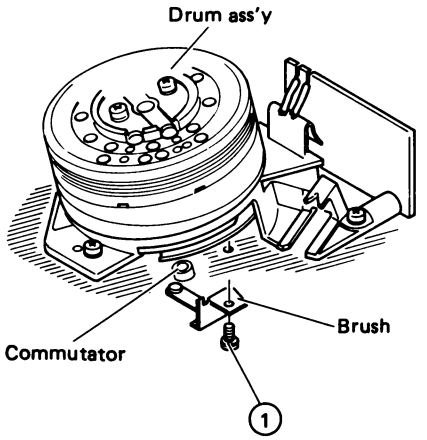


Fig. 2-3-16 Replacement of brush

2.3.12 Tension band

1. Take out slit washer ① to remove the tension arm, and disengage the spring from the tension arm.
2. Take out slit washer ② and remove the supply loading brake with spring.
3. Take out screw ③ and remove the tension band and tension arm together in the upward direction. Use care regarding the washer.

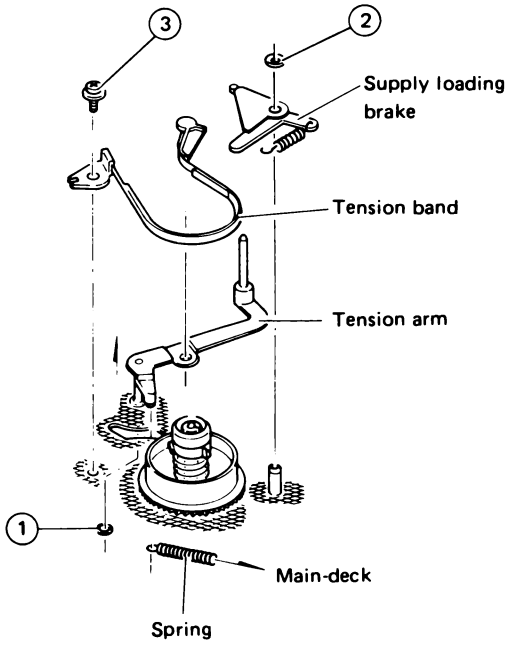


Fig. 2-3-17 Replacement of tension band

4. Disengage the tension band from the tension arm, and replace the tension band.
5. Clean and lubricate the tension arm shaft with sewing machine oil, and reassemble by reversing the above steps.
6. Perform the tension pole position check and the back tension check (refer to sections 2.4.2 and 2.4.4).

2.3.13 Pick-up head

1. Unsolder the two wires from the terminals of the pick-up head.
2. Take out screw ① and remove the pick-up head.
3. Replace and reassemble the pick-up head by reversing the above steps. Use care regarding the wire polarity. Check that the pick-up head is toward the center portion of the drum shaft.
4. Perform the drum pulse level adjustment (refer to section 3.5, No. 1).

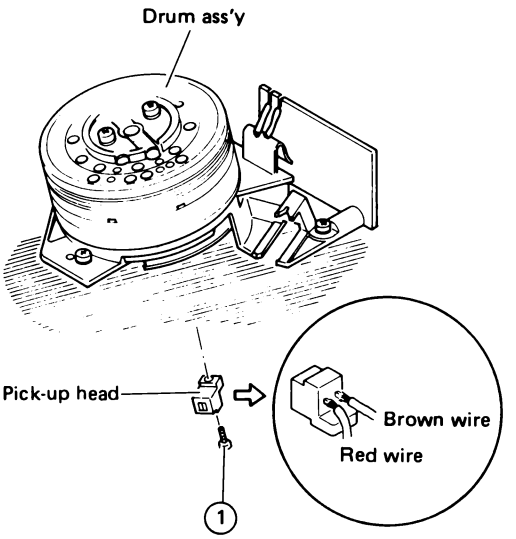


Fig. 2-3-18 Replacement of pick-up head

2.4 CHECKS AND ADJUSTMENTS

2.4.1 Mechanism timing check

- Loading rings and loading gear (2)

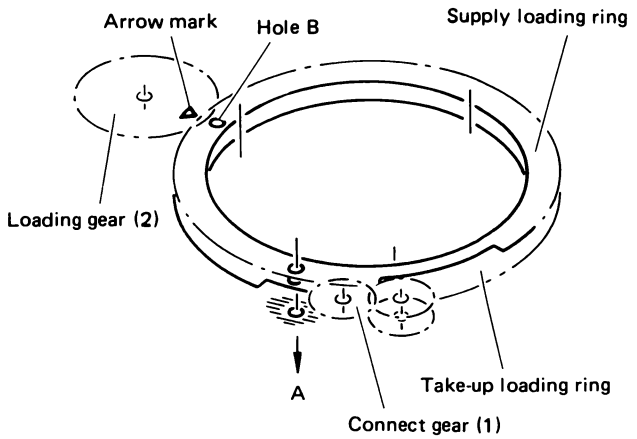


Fig. 2-4-1 Loading ring/loading gear (2)

1. Confirm that the two holes of supply and take-up loading rings are aligned with the hole of the main-deck (arrow A in Figure). If a discrepancy is noted, after removing the loading gear (2), adjust the loading rings to obtain the correct position.
2. At the same time, confirm that the arrow mark of the loading gear (2) corresponds with hole B of the supply loading ring. If a discrepancy is noted, remove and reinstall the loading gear (2) to obtain the correct position.

- Cam gear (drive gear bracket) and loading gear (1)

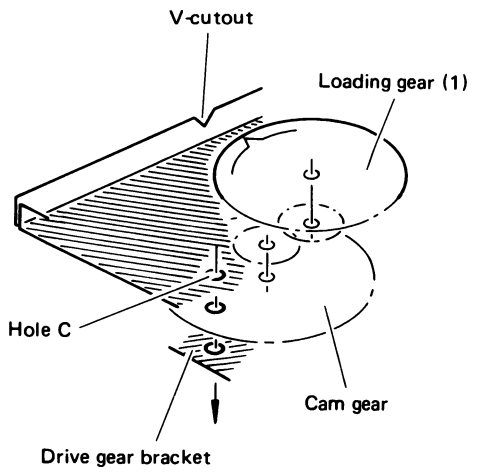


Fig. 2-4-2 Cam gear/loading gear (1)

1. When the two holes of the cam gear and drive gear bracket are aligned with hole C of the main-deck, confirm that the arrow mark of loading gear (1) is aligned with the V-cutout portion of the main-deck. If a discrepancy is noted, remove and reinstall the loading gear (1) to obtain the correct position.

2.4.2 Tension pole position check

1. Without loading a tape, set for the Play mode (refer to section 2.3.1).
2. As indicated in Fig. 2-4-3, check that the center of the tension pole is aligned with the left edge of the base support of the guide pin.
3. If necessary, loosen screw (1) and adjust the tension band holder to obtain the correct tension pole position.

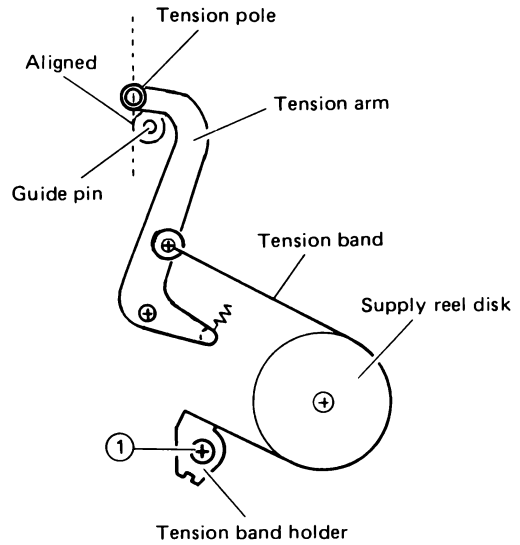


Fig. 2-4-3 Tension pole position

2.4.3 Take-up torque check

1. Set the play (SP) mode without the cassette housing.
2. Set the torque gauge on the take-up reel disk.
3. Relax the grip on the torque gauge so that the indicator needle and scale rotate at equal speed, then read the indication. The correct value is between 60 and 100 g-cm.
4. If not the correct value, install a new take-up clutch. In addition to replacing the supply clutch should also be replaced. (Refer to section 2.3.10).

2.4.4 Back tension check

1. Use the back tension cassette gauge and set for the Play (SP) mode.
2. Confirm that the indication is between 11 and 19.
3. If not the correct value, check the tension pole position (refer to section 2.4.2) and the condition of the spring between tension arm and main-deck.
4. If necessary, replace the tension band (refer to section 2.3.12).

2.4.5 Tape transport system checks and adjustments

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following check is therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

- Tape transport checks

1. Use a 180-minute tape and check at the tape beginning and ending portion according to the following steps.

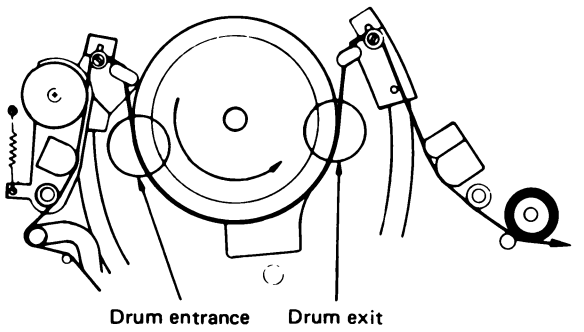


Fig. 2-4-4 Drum entrance/exit

1) During Play mode, observe tape at the entrance and exit portions of the drum lead.
Confirm that the tape slips neither upward nor downward with respect to the lead.

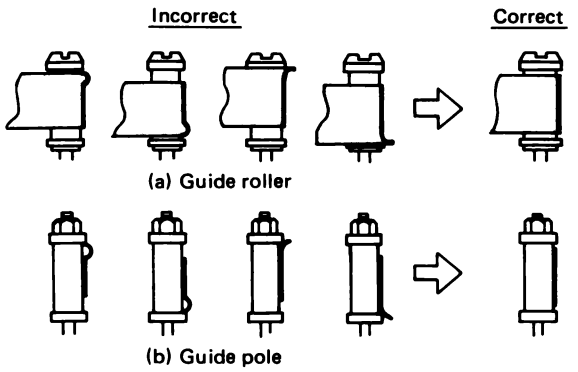


Fig. 2-4-5 Guide roller/guide pole

2) If defects are noted during the above check, perform the guide roller height adjustment.
3) During Play mode, observe the tape at the take-up and supply guide poles and guide rollers.
Confirm absence of curling, wrinkling, etc.
4) If defects are noted during the above check, perform the guide pole height adjustment.

2. At the ending portion of the recorded 180-minute tape, set for the Search Rev. (9 times speed) mode.

1) Confirm absence of curling, wrinkling, slippage, etc at the take-up guide pole.
2) If defects are noted during the above checks, perform the reverse tape path adjustment.

3. Perform the interchangeability checks and adjustment (refer to section 2.4.6).

- Guide roller height adjustment

1. Slightly loosen the setscrew under the guide roller of the pole base.
2. Use a cassette tape and set for the Play mode.
3. With a screwdriver, slightly turn the guide roller so that the tape travels smoothly in the drum lead without slipping upwards or downwards.

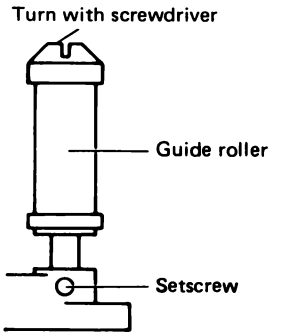


Fig. 2-4-6 Guide roller height adjustment

Notes:
1) Loosen the setscrew only enough to allow the guide roller to be turned.
If excessively loose, tape motion may turn the roller inadvertently.
2) Turn the roller carefully to avoid damage to the tape.

- Supply guide pole height adjustment

1. Remove the left bracket of the main-deck by taking out the two screws, set the height gauge on the main-deck.

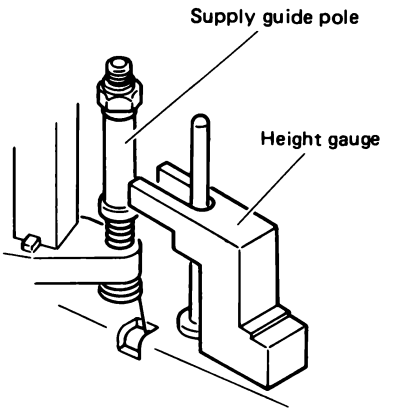


Fig. 2-4-7 Height of supply guide pole

2. Check the height of the upper face of the lower flange. If necessary, carefully adjust by turning the nut.
3. Use a cassette tape and set for the Play mode.

4. Use a metric nutdriver to turn the nut to align the tape lower edge with the upper face of the lower guide flange. However, this adjustment must be performed within ±0.5 mm (1 turn: 0.5 mm) of the height adjusted by the height gauge.
5. If there is a large discrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

- Take-up guide pole check

1. Use a cassette tape and set for the Play mode.
2. Turn audio/control head screw ① and align the tape lower edge with the upper face of the lower guide flange.

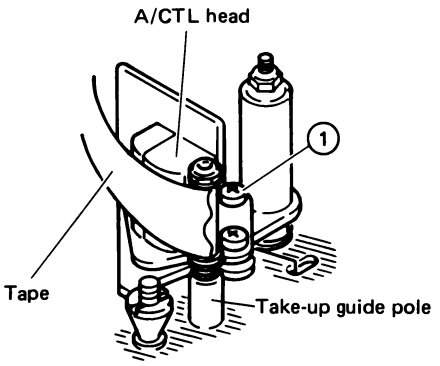


Fig. 2-4-8 Take-up guide pole

Note: Cannot adjust the height of the take-up guide pole.

- Reel disk height check

1. Set the height gauge on the main-deck.

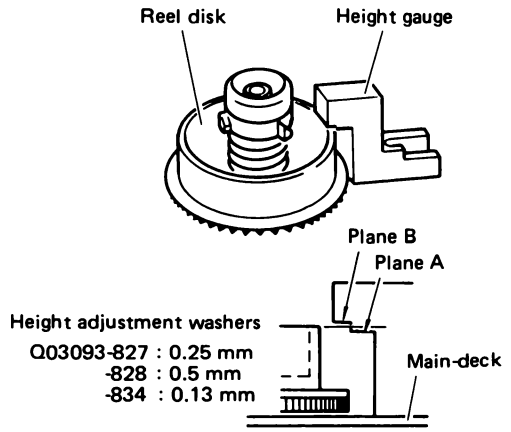


Fig. 2-4-9 Height of reel disk

2. Check the reel disk height. The correct height is between planes A and B.
3. If not correct, use the height adjustment washers to obtain the correct height.

- Reverse tape path adjustment

1. At the ending portion of the recorded 180-minute tape, set for the Search Rev. (9 times speed) mode.
2. Adjust the setscrew of the guide arm for smooth tape transport at the take-up guide pole.

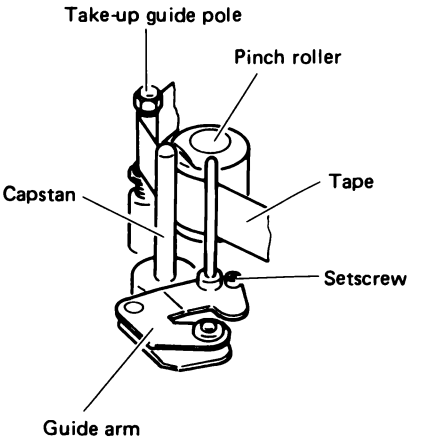


Fig. 2-4-10 Reverse tape path

Note: Two or three seconds may elapse after adjusting the setscrew for the effect to appear at the take-up guide pole.

3. If defects are noted, repeat the above steps 1 and 2.

2.4.6 Interchangeability checks and adjustments

Before using an alignment tape, use a regular tape and confirm correct tape transport operation.

- Preliminary checks and adjustments

1. Connect an oscilloscope to TP-6 (FM OUT) of the VIDEO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the VIDEO board.
2. Play the alignment tape (stairstep signal) MH-2.

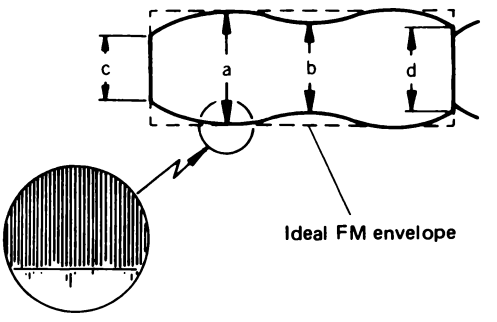


Fig. 2-4-11 FM waveform (max. output)

1) Turn the TRACKING knob to obtain the maximum FM output.
Observe the FM waveform, read the maximum level (a) and the minimum levels (b), (c) and (d). Confirm that:

$$\frac{b}{a} \geq 0.7,\ \frac{c}{a} \geq 0.5 \text{ and } \frac{d}{a} \geq 0.5$$

Note: If the waveform is serrated, read the value at the most uniform serrations.

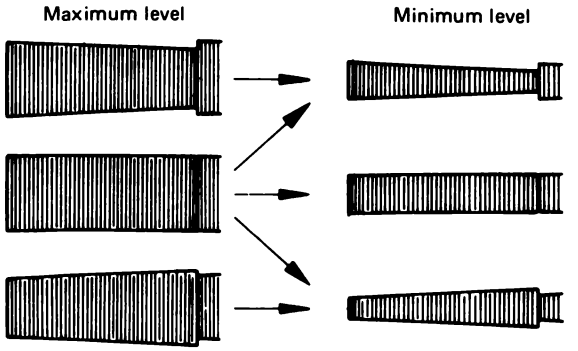


Fig. 2-4-12 Normal waveform examples

2) Turn the TRACKING knob to vary the FM output from maximum to minimum.
Confirm that the waveform variation is nearly parallel.
3) If the above checks yield normal results, proceed to the audio/control head adjustments.
If defects are noted, perform the following adjustments.

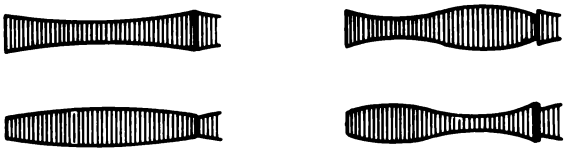


Fig. 2-4-13 Incorrect waveform examples

3. Loosen the setscrews of the supply and take-up guide rollers. If the guide rollers turn freely, slightly tighten the setscrews.
4. Play the alignment tape (stairstep signal) MH-2.
5. Observe oscilloscope display and adjust the TRACKING knob for maximum FM output.

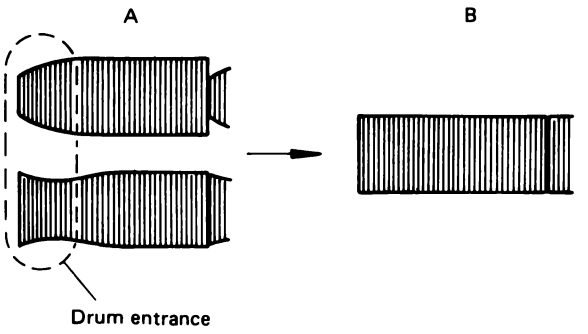


Fig. 2-4-14 Drum entrance adjustment

1) Refer to Fig. 2-4-14. Examples of incorrect waveforms are shown by A.
Use a screwdriver to adjust the supply guide roller so that the rising portion (drum entrance) of the waveform becomes flat as shown by B.
2) In the same manner as for the drum entrance, turn the take-up guide roller to adjust the falling portion (drum exit) of the FM waveform.
Incorrect examples are shown by C in Fig. 2-4-15, while D indicates the correct adjustment.

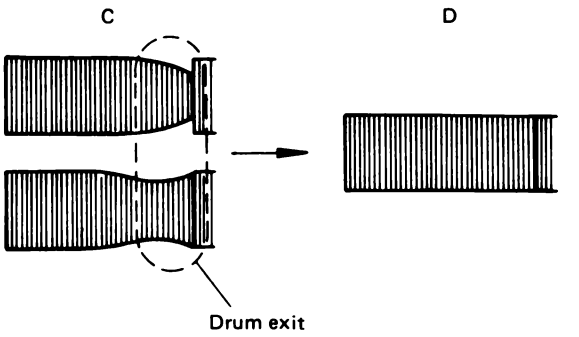


Fig. 2-4-15 Drum exit adjustment

3) In addition to observing the waveform, confirm absence of tape slippage or curling at the supply and take-up guide poles.
If the tape separates from the guide or wrinkling occurs at the supply guide pole, adjust the supply guide pole height (refer to section 2.4.5).
If at the take-up guide pole, adjust by turning the audio/control head screw (refer to section 2.4.5).

6. Observe the FM waveform and adjust the TRACKING knob for minimum FM output level.

1) If the waveform becomes similar to A, B, C or D in Fig. 2-4-16, carefully adjust the supply and take-up guide rollers so that the waveform becomes similar to E, F of G.

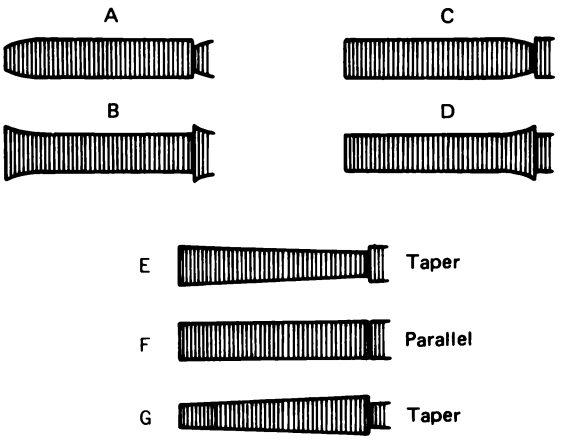


Fig. 2-4-16 Minimum FM waveform

Note: At this time, if the waveform fluctuates, adjust for minimum fluctuation.

2) Vary the FM output level and perform fine adjustment of the supply and take-up guide rollers.

- Audio/control head height and azimuth adjustments

Incorrect audio/control head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.

1. Connect CH-1 probe of the oscilloscope to the terminal (L. AUDIO OUT) and CH-2 probe to the terminal (R. AUDIO OUT) of the TERMINAL board.
2. Set the AUDIO OUT switch to STEREO.
3. Play 6 kHz segment (stairstep signal) of the alignment tape MH-2.

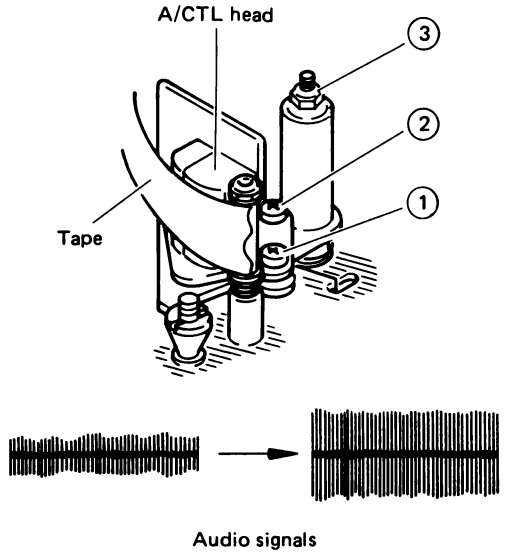


Fig. 2-4-17 Audio/Control head adjustment

1) Turn screw ① and screw ② to obtain two maximum audio outputs (CH-1 and CH-2). Adjust azimuth with screw ① and with screw ② so that small tape wrinkles are not produced at the take-up guide pole.
2) Turn nut ③ so that the two audio outputs become maximum.
3) Observe the audio waveforms and adjust screw ① so that the CH-1 waveform in phase with the CH-2 waveform.

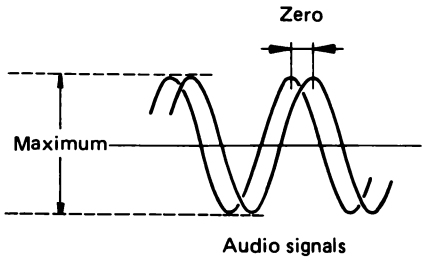


Fig. 2-4-18 Audio head phase adjustment

- Setscrew tightening

1. After confirming absence of tape wrinkling and other transport irregularities, tighten the setscrews while in the Stop mode.

   Note: Since the guide rollers are easily moved, use care when tightening.
2. Again perform the preliminary checks.

- Servo circuit adjustment

1. Perform P.B./REC switching point adjustment (refer to sections 3.5, No. 4 and 5).
2. Perform tracking preset adjustment (refer to section 3.5, No. 6 and 7).

- Control head phase adjustment

1. Connect an oscilloscope to TP-6 (FM OUT) of the VIDEO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the VIDEO board.
2. Play the alignment tape (stairstep signal) MH-2.
3. Set the trigger to ⊕ slope and observe the CH-2 FM waveform.

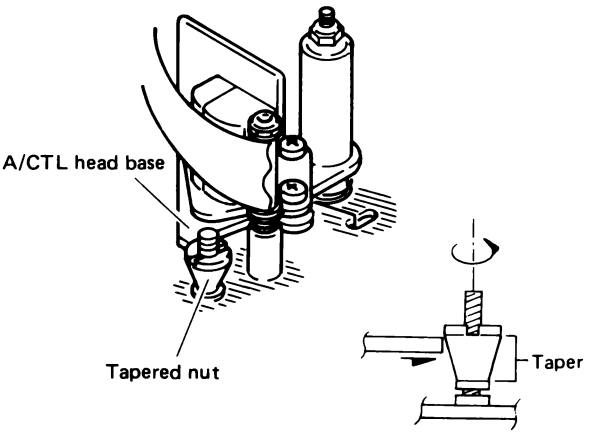


Fig. 2-4-19 Control head phase adjustment

1) Set the TRACKING knob to AUTO (center click position).
2) Turn the tapered nut clockwise so that the A/CTL head base comes into contact with the upper border of the taper portion of the tapered nut as shown in Fig. 2-4-19.
3) Observe the FM output level and turn the tapered nut counterclockwise to obtain the first maximum FM output level.

- Final checks

1. Connect an oscilloscope to TP-6 (FM OUT) of the VIDEO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the VIDEO board.

   1) Play stairstep segment of the alignment tape MH-2L. Confirm that the FM waveform also satisfies the specifications during playback of MH-2.

   2) Supply a video signal and perform recording, then playback (both SP/LP modes).
   Observe the FM waveform, read the maximum level (a) and the minimum levels (b), (c) and (d) in Fig. 2-4-11. Confirm that :

   $\frac{b}{a} \geqq 0.7$, $\frac{c}{a} \geqq 0.5$ and $\frac{d}{a} \geqq 0.5$

   Confirm that the FM waveform also satisfies the specifications during playback of MH-2 stairstep signal.

2. Perform overall checks and adjustments of the servo circuit (refer to section 3.5) and video circuit (refer to section 3.6).

3. Perform the audio circuit adjustment (refer to section 3.4).

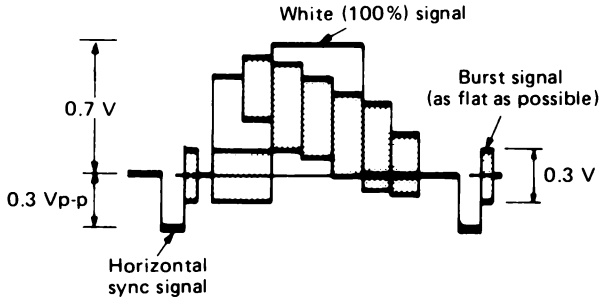
SECTION 3
ELECTRICAL ADJUSTMENTS

3.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts.
It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

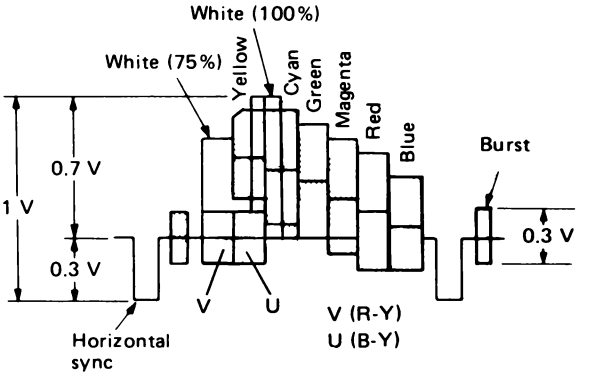
3.2 REQUIRED TEST EQUIPMENT AND JIGS

1. Colour television or monitor
2. Oscilloscope: wide-band, dual-trace, triggered delayed sweep
3. Frequency counter
4. Audio oscillator
5. Audio voltmeter
6. Digital voltmeter
7. Signal generator: RF/IF sweep/marker
8. Signal generator: PAL colour bar, stairsteps
9. Servo checker
10. Recording tape
11. Alignment tape: MH-2, MH-2L



Colour bar signal of pattern generator

Fig. 3.2.1



Colour bar signal waveform

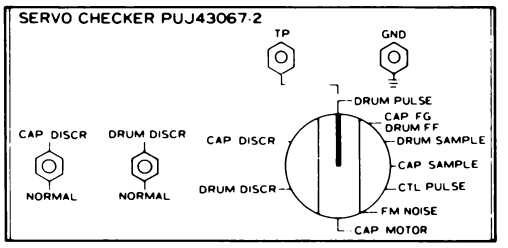
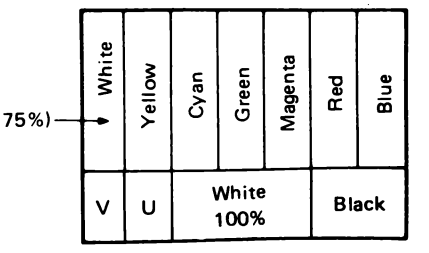


Fig. 3.2.2



Colour bar pattern

Fig. 3.2.3

3.2.1 JVC Alignment Tape Contents

1. MH-2 (Standard Play) contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairsteps	6 kHz	• Interchangeability checks and adjustments • Servo circuit checks and adjustments • Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	• Tape speed checks • Wow and flutter checks
3	10 minutes	Colour bars	1 kHz	• Video signal playback circuit checks and adjustments • Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep	(none)	• Video head resonance adjustments • Markers: 2.0, 4.0, 5.0 MHz

Table 3.2.1

2. MH-2L (Long Play) contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	5 minutes	Stairsteps (No signal in CH2)	(none)	• Interchangeability checks and adjustments • Servo circuit checks and adjustments
2	5 minutes	Colour bars	(none)	• Video signal playback circuit checks and adjustments

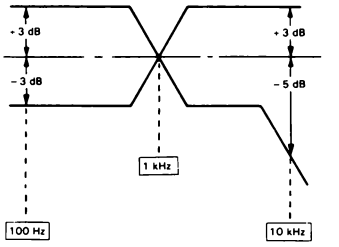
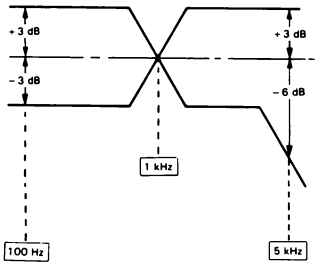
Table 3.2.2

3.3 REGULATOR CIRCUIT ([02] REGULATOR board)

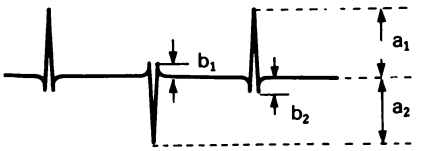
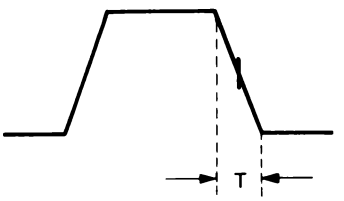
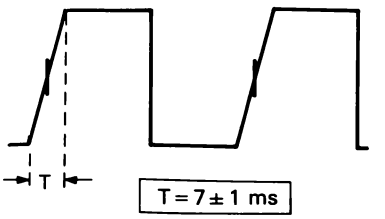
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SWD 9 V	TP1 (SWD 9 V) TP3 (GND)	R10 (9 V ADJ)	REC	1. Connect a digital voltmeter between TP1 and TP3 2. Adjust R10 for 9.1±0.1 V.
2	SWD 6 V	TP2 (SWD 6 V) TP3 (GND)	R17 (6 V ADJ)	REC	1. Connect a digital voltmeter between TP2 and TP3. 2. Adjust R17 for 6.3±0.05 V.

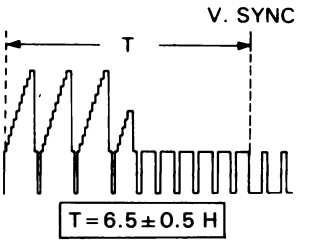
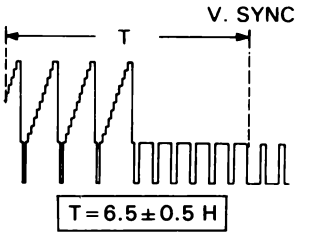
3.4 AUDIO CIRCUIT ([05] AUDIO board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Audio PB Level	Audio Line Out	R23 (CH1 PB LEVEL) R73 (CH2 PB LEVEL)	MH-2 PB (1 kHz)	1. Play the alignment tape (Audio 1 kHz signal) and set the DOLBY NR switch to OFF and the AUDIO OUT switch to STEREO. 2. Adjust R23 (CH1) for LINE OUT −20 dBs (0.22 Vp-p)/PERI CONN −8 dBs (0.87 Vp-p) at AUDIO CH1(L) OUT. 3. Adjust R73 (CH2) for LINE OUT −20 dBs (0.22 Vp-p)/PERI CONN −8 dBs (0.87 Vp-p) at AUDIO CH2(R) OUT.
2.	Audio Bias Level	Both ends of R1 ([12] A/CTL HEAD board) Both ends of R2 ([12] A/CTL HEAD board)	R119 (CH1 BIAS ADJ) R120 (CH2 BIAS ADJ)	REC (LP mode)	1. Set for the REC mode without signal. 2. Connect a digital voltmeter to both ends of R1 ([12] A/CTL HEAD board). 3. Adjust R119 (CH1) for 2.3±0.1 mV. 4. Connect a digital voltmeter to both ends of R2 ([12] A/CTL HEAD board). 5. Adjust R120 (CH2) for 2.3±0.1 mV.
3	Audio REC Level	Audio Line Out	R27 (CH1 REC LEVEL) R77 (CH2 REC LEVEL)	−20 dBs/1 kHz (LINE INPUT LEVEL) REC (SP mode) ↓ PB	1. Set the DOLBY NR switch to OFF and the AUDIO OUT switch to STEREO. 2. Record and playback a video signal and an audio signal. 3. During recording, adjust R27 (CH1) and R77 (CH2) to obtain LINE OUT −6±1 dBs (0.98 to 1.23 Vp-p) at PB mode.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
4	Frequency Response	Audio Line Out	R119 (CH1 BIAS ADJ) R120 (CH2 BIAS ADJ)	−30 dBs/100, 1 k, 10 kHz REC (SP mode) ↓ PB −30 dBs/100, 1 k, 5 kHz REC (LP mode) ↓ PB	1. Set the DOLBY NR switch to ON and the AUDIO OUT switch to STEREO. 2. Supply a video signal to VIDEO IN. 3. Supply 100 Hz, 1 kHz and 10 kHz audio signals at −30 dBs and record then play back. 4. Set the 1 kHz level for 0 dB reference signal and confirm frequency response as shown in Fig. 3.4.1. 5. In the same manner as SP mode, confirm the frequency response as shown in Fig. 3.4.2.  Fig. 3.4.1  Fig. 3.4.2 Note: The bias levels must be set to the follows. 2.6±0.5 mV (SP mode) 2.2±0.5 mV (LP mode)

3.5 SERVO CIRCUIT ([04] A/S/M board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Drum Pulse Level	TP6 (DRUM PICK UP PULSE)	R82 (DRUM PICK UP PULSE)	Colour bar or TV signal REC (SP mode)	1. Connect an oscilloscope to TP6. 2. Record a colour bar signal. 3. After drum servo is locked, adjust R82 as shown in Fig. 3.5.1.  $a_1, a_2 \geqq 0.7$ V $b_1, b_2 \leqq 0.2$ V **Fig. 3.5.1**
2.	Drum DISCR Position	TP7 (DRUM SAMPLE) TP21 (DPC)	R94 (DRUM DISCR)	Colour bar or TV signal REC (SP mode)	1. Connect an oscilloscope to TP7. 2. Record a colour bar signal. 3. Connect TP21 to GND, and adjust R94 to stabilize the sampling pulse with respect to the trapezoid as shown in Fig. 3.5.2. (At this time, a sideways drift at the rate of less than 40 ms in 5 seconds is acceptable.) 4. Disconnect TP21 from GND, and confirm a stable sampling pulse positioned at the center of the ramp.  T = 6.5 ± 1 ms **Fig. 3.5.2**
3	Capstan DISCR Position	TP3 (CAP SAMPLE) TP22 (CPC)	R16 (CAP DISCR)	Colour bar or TV signal REC (SP mode)	1. Connect an oscilloscope to TP3. 2. Record a colour bar signal. 3. Connect TP22 to GND, and adjust R16 to stabilize the sampling pulse with respect to the trapezoid as shown in Fig. 3.5.3. (At this time, a sideways drift at the rate of less than 40 ms in 5 seconds is acceptable.) 4. Disconnect TP22 from GND, and confirm a stable sampling pulse positioned at the center of the ramp.  T = 7 ± 1 ms **Fig. 3.5.3**
				Colour bar or TV signal REC (LP mode)	5. Confirm a stable sampling pulse positioned at the center of the ramp as shown in Fig. 3.5.3.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
4	PB Switching Point	TP11 ([03] VIDEO board) (Drum FF) TP10 ([03] VIDEO board) (VIDEO OUT)	R84 (CH1 SW) R86 (CH2 SW)	MH-2 Stairsteps PB (SP mode)	1. Connect an oscilloscope to TP10 ([03] VIDEO board) (VIDEO OUT). 2. Play the alignment tape (Stairsteps). 3. Trigger the oscilloscope externally (-slope) with the signal from TP11 ([03] VIDEO board) (Drum FF). 4. Adjust R84 to position the trigger point 6.5±0.5 H before V sync as shown in Fig. 3.5.4.  **Fig. 3.5.4** 5. Trigger the oscilloscope externally (+slope) with the signal from TP11 ([03 VIDEO board] (Drum FF). 6. Adjust R86 to position the trigger point 6.5±0.5 H before V sync as shown in Fig. 3.5.5.  **Fig. 3.5.5**
			R88 (LP DELAY)	MH-2L Stairsteps PB (LP mode)	7. Set trigger slope of the oscilloscope to minus (−). 8. Adjust R88 to position the trigger point 6.5±0.5 H before V sync as shown in Fig. 3.5.4.
5	REC Switching Point	TP11 ([03] VIDEO board] (Drum FF) TP10 ([03] VIDEO board) (VIDEO OUT)	R40 (REC SW)	Colour bar or TV signal REC (SP mode)	1. Connect an oscilloscope to TP10 ([03] VIDEO board) (VIDEO OUT). 2. Record a colour bar signal. 3. Trigger the oscilloscope externally (−slope) with the signal from TP11 ([03] VIDEO board) (Drum FF). 4. Adjust R40 to position the trigger point 6.5±0.5 H before V sync as shown in Fig. 3.5.4.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
6	Tracking Preset	TP1 (PB CTL PULSE) TP11 ([03] VIDEO board) (Drum FF)	R48 (TRACKING PRESET)	Stairsteps REC (SP mode) ↓ PB	1. Set the TRACKING (R50) control to the center click position. 2. Trigger the oscilloscope externally (−slope) with the signal from TP11 ([03] VIDEO board) (Drum FF). 3. Set for the REC mode and make a note of the TP1 (REC CTL PULSE) waveform rise point. 4. Play back the recorded segment. Adjust R48 to align the rising point of the TP1 (PB CTL PULSE) waveform with the REC CTL waveform rise point noted in step 3, and as shown in Fig. 3.5.6.
7	LP Tracking Preset	TP6 ([03] VIDEO board) (PB FM)	R60 (LP TRACKING PRESET)	MH-2L Stairsteps PB	1. Set the TRACKING (R50) control to the center click position. 2. Play an alignment tape and adjust R60 so that the FM output level becomes maximum. Note: If there are two points where maximum FM is attained, set the control to the more clockwise of these points.
8	V Pulse	TP10 ([03] VIDEO board) (VIDEO OUT)	R80 (V PULSE)	Colour bar REC (SP mode) ↓ PB ↓ STILL	1. Record and playback a colour bar signal. 2. Set for the STILL playback mode. 3. Observe the picture display and adjust R80 for minimum vertical jitter. 4. Confirm that the V pulse width becomes 230±40 μs.
9	H Discriminator	TP12 ([03] VIDEO board) (SYNC OUT)	R62 (H DISCR)	MH-2 Colour bar PB	1. Connect an oscilloscope to TP12 ([03] VIDEO board) (SYNC OUT). 2. Trigger the oscilloscope externally (+slope) with the signal from TP12 ([03] VIDEO board) (SYNC OUT). 3. Set for the Playback mode and make a note of the H sync pulse as T as shown in Fig. 3.5.7. 4. Set for the REV SEARCH mode and adjust R62 to obtain T′=(T-0.2)±0.2 μs as shown in Fig. 3.5.7.

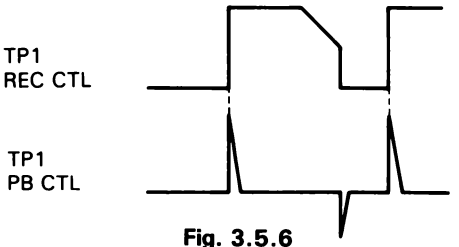


Fig. 3.5.6

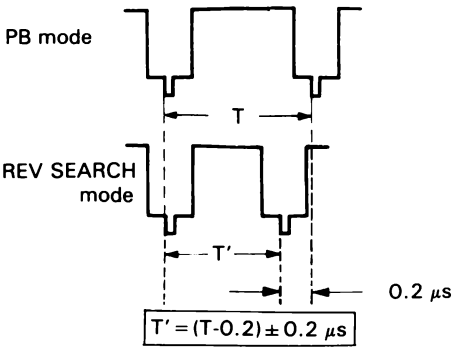
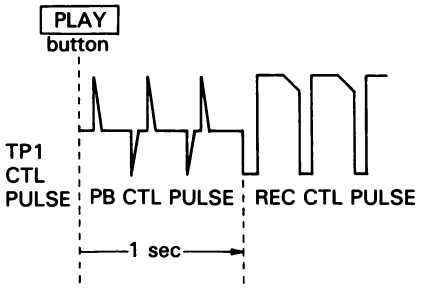
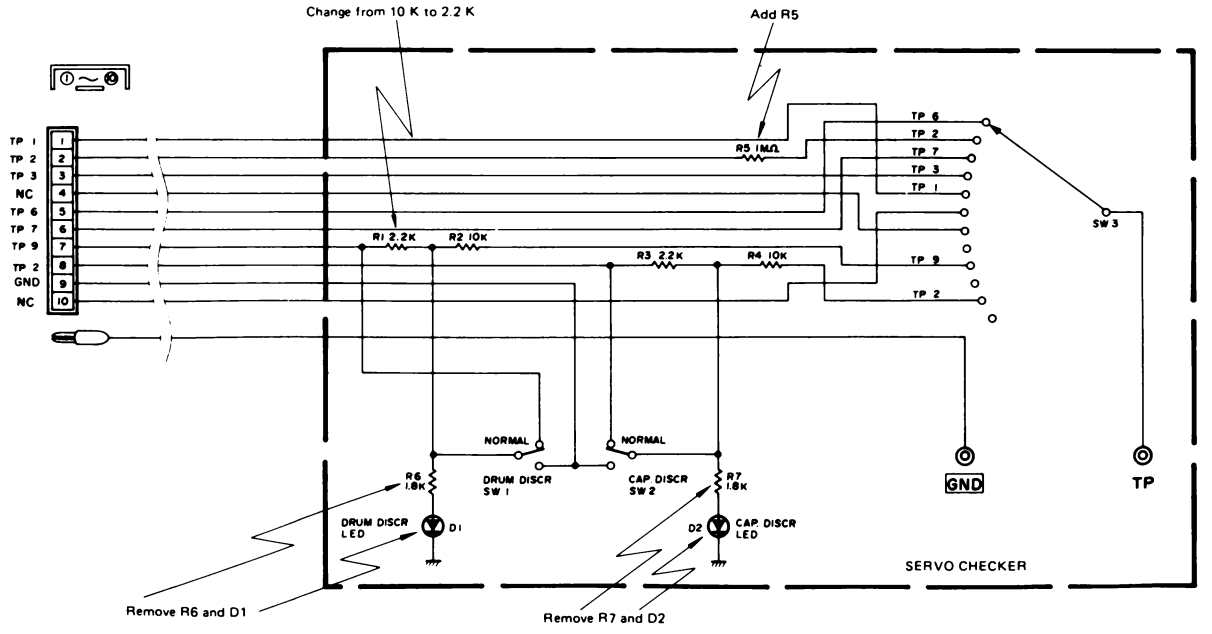


Fig. 3.5.7

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
10	Assembly Edit Check	TP1 (PB CTL PULSE) TP3 (CAP SAMPLE)	——	Colour bar REC (SP mode) ↓ PB	1. Observe the waveforms of TP1 and TP3 during REC mode. 2. Record a colour bar signal. 3. Press the PAUSE/STILL button, then confirm that a tape is rewound for 1.5 seconds at the SP mode speed. 4. Press the PLAY button (REC mode), confirm that the PB CTL PULSE waveform is changed to the REC CTL PULSE waveform after about 1 second at TP1, and then confirm that the drum servo is locked at TP3. 5. Confirm that assembly recording is performed where by the playback picture does not skip or roll at the edit point.  **Fig. 3.5.8**



SERVO CHECKER

Fig. 3.5.9

3.6 VIDEO CIRCUIT ([03] VIDEO board)

<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal & Mode</th><th>Description</th></tr>
<tr><td rowspan="2">1</td><td>(A)
Video Head
Resonance
&
Quality Factor

([16]
PRE AMP
board)</td><td>TP2
(CH1
REC FM)

TP1
(CH2
REC FM)</td><td>C17
(SP CH1 fo)
R22
(SP CH1 Q)

C14
(SP CH2 fo)
R21
(SP CH2 fo)

C10
(LP CH1 fo)
R16
(LP CH1 Q)

C7
(LP CH2 fo)
R15
(LP CH2 Q)</td><td>RF Sweep
PB (SP mode)

RF Sweep
PB (LP mode)</td><td>1. Set for the playback mode without a tape. (Refer to mechanical adjustment 2.3.1)
2. Connect a sweep generator to TP2 (CH1) and TP1 (CH2).
3. Adjust C17 (CH1) and C14 (CH2) for 5.0 MHz peaking, and R22 (CH1) and R21 (CH2) so that the ratio between 1 MHz and 5 MHz level becomes 2:5 as shown in Fig. 3.6.1

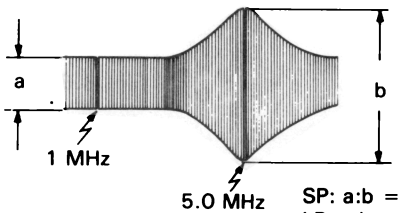
4. Connect 1 kΩ resistor between TP24 and TP27.
5. Perform adjustment in the same manner as SP mode CH1, CH2.
Connect a sweep generator to TP2 (CH1) and TP1 (CH2).
6. Adjust C10 (CH1) and C7 (CH2) for 5.0 MHz peaking, and R16 (CH1) and R15 (CH2) so that the ratio between 1 MHz and 5 MHz level becomes 2:5 as shown in Fig. 3.6.1</td></tr>
<tr><td colspan="4"> 

Fig. 3.6.1</td></tr>
<tr><td></td><td>(B)
Video Head
Resonance
&
Quality Factor

([16]
PRE AMP
board)</td><td>TP2
(CH1
REC FM)

TP1
(CH2
REC FM)</td><td>C17
(SP CH1 fo)
R22
(SP CH1 Q)

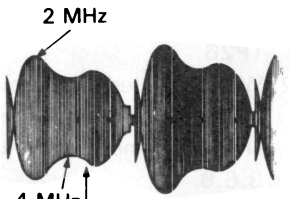
C14
(SP CH2 fo)
R21
(SP CH2 fo)</td><td>MH-2
RF Sweep
PB (SP mode)</td><td>1. Set trigger of an oscilloscope to minus (CH1) /plus (CH2).
2. Turn R22 (CH1)/R21 (CH2) fully counterclockwise as viewed from bottom.
3. Adjust C17 (CH1)/C14 (CH2) to set the resonance point to 5 MHz as shown in Fig. 3.6.2.
4. If the levels of CH1 and CH2 differ, adjust the higher level channel to match the lower by using R22 (CH1) and R21 (CH2)
5. Record a video signal, then play back and confirm absence of flicker and black-white reversal in the reproduced picture. If necessary, carefully readjust R22 (CH1) and R21 (CH2).</td></tr>
<tr><td colspan="4"> 

Fig. 3.6.2</td></tr>
<tr><td></td><td></td><td></td><td>C10
(LP CH1 fo)
R16
(LP CH1 Q)

C7
(LP CH2 fo)
R15
(LP CH2 Q)</td><td>RF Sweep
PB (LP mode)</td><td>6. Connect 1 kΩ resistor between TP24 and TP27.
7. Peform adjustment in the same manner as for the SP mode CH1, CH2. Turn R16 (CH1) /R15 (CH2) fully counterclockwise as viewed from bottom.
8. Adjust resonance with C10 (CH1)/C7 (CH2) and Q with Q16 (CH1)/R15 (CH2).</td></tr>
</table>

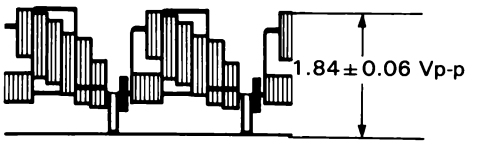
<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal & Mode</th><th>Description</th></tr>
<tr><td>2</td><td>Video
E-E Level</td><td>TP10
(VIDEO OUT)</td><td>R123
(EE VIDEO Level)</td><td>Colour bar
E-E</td><td>1. Supply a colour bar input signal.
2. With a 75 Ω load at VIDEO OUT, adjust R123 for 1.84±0.06 Vp-p as shown in Fig. 3.6.3
 

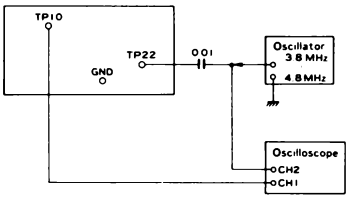
Fig. 3.6.3</td></tr>
<tr><td>3</td><td>Carrier & Deviation</td><td colspan="3">IMPORTANT:
Ordinarily avoid performing this adjustment. It should be performed only if IC7 of the VIDEO board has been replaced or if significant waveform distortion and S/N deterioration occur during recording and playback due to deficient adjustment of the carrier set and deviation.</td><td>Note:
Before adjustment, turn R100 (DARK CLIP) fully counterclockwise and R108 (WHITE CLIP) fully clockwise so that the signal is not limited.
 

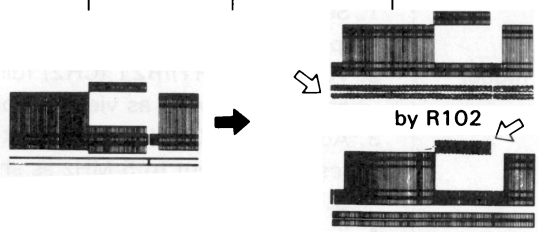
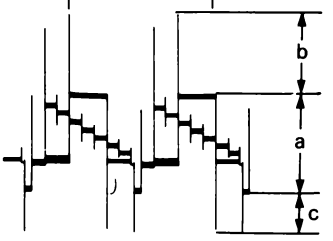
Fig. 3.6.4</td></tr>
<tr><td></td><td></td><td>TP22
(CARRIER & DEVIATION)</td><td>R102
(CARRIER)
R105
(DEVIATION)</td><td>Colour bar
E-E</td><td>1. Connect the equipment as shown in Fig. 3.6.4
2. Set the oscilloscope to ADD mode and adjust the vertical gain of the oscilloscope and signal generator output to easily observe beat.
3. Set the signal generator for 3.8 MHz $^{+0}_{-50}$ kHz and adjust R102 to set the carrier as shown in Fig. 3.6.5
4. Set the signal generator for 4.8 MHz $^{+0}_{-50}$ kHz and adjust R105 to set the deviation as shown in Fig. 3.6.5.</td></tr>
<tr><td></td><td></td><td colspan="3"> 

Fig. 3.6.5</td><td></td></tr>
<tr><td>4</td><td>White Clip & Dark Clip</td><td>TP3
(W/D CLIP)</td><td>R108
(WHITE CLIP)
R100
(DARK CLIP)</td><td>Colour bar
E-E</td><td>1. Connect a 220 Ω load between TP22 and TP26.
2. With the rated signal level taken as 100%, adjust R108 so that the white peak overshoot becomes 90±2% as shown in Fig. 3.6.6.
3. In the same condition, adjust R100 so that the sync tip undershoot becomes 45±3% as shown in Fig. 3.6.6.</td></tr>
<tr><td></td><td></td><td colspan="3"> 

a:b = 100:88−92
a:c = 100:43−47
Fig. 3.6.6</td><td></td></tr>
</table>

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
5	AFC	TP422 (SUB CONV)	R465 (AFC)	Colour bar REC (SP mode)	1. Connect a jump wire between TP421 and TP423. 2. Adjust R465 to obtain 625 kHz ± 5 kHz.
6	VXO	TP403 (VXO)	R461 (VXO)	MH-2 Colour bar PB	1. Connect a frequency counter to TP403 2. Play the alignment tape (Colour bar). 3. Adjust R461 for 4.433619 MHz ± 50 Hz.
7	Inverted Colour Level	TP405 (PB COLOUR 2 4.43 MHz)	R523 (INVERTED COLOUR LEVEL)	MH-2 Colour bar PB	1. Connect an oscilloscope to TP405 and observe signal level. 2. Connect jump wires between TP429, TP430 and GND. Again check the TP405 level. 3. Adjust R523 to obtain the same level in both cases as shown in Fig. 3.6.7
8	0.5 H Delayed Video Level	TP425 (ORIGINAL VIDEO IN) TP426 (0.5 H DELAYED VIDEO)	R496 (0.5 H DELAYED VIDEO LEVEL)	MH-2 Colour bar PB	Note: Perform the 0.5 H Delayed Video Level adjustment after completing Inverted Colour Level. 1. Connect one channel of a dual trace oscilloscope to TP425 and the other channel to TP426. 2. Adjust R496 to obtain the same level in both cases as shown in Fig. 3.6.8
9	APC Error Phase	TP425 (ORIGINAL VIDEO IN) TP428 (7.8 kHz)	L420 (7.8 kHz TUNING)	MH-2 Colour bar PB	1. Connect one channel of a dual trace oscilloscope to TP425 and the other channel to TP428 and observe the waveforms. 2. Adjust L420 to position the zero-cross 30 μ ± 3 μsec from the center of the burst signal as shown in Fig. 3.6.9

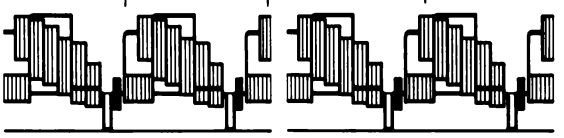


Fig. 3.6.7

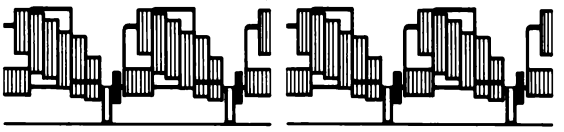


Fig. 3.6.8

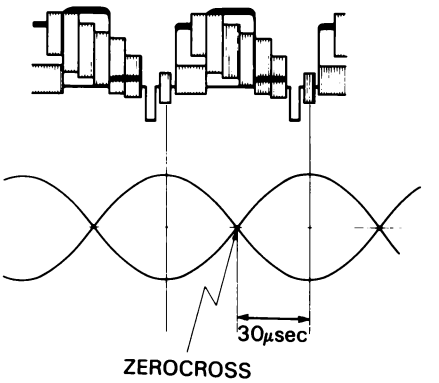
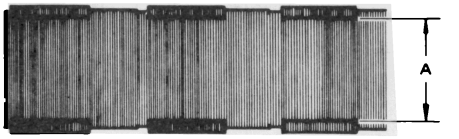
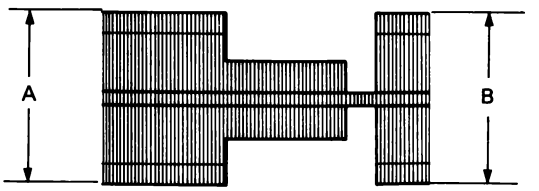
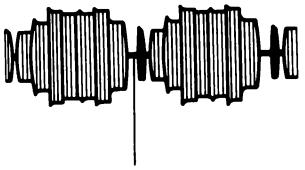
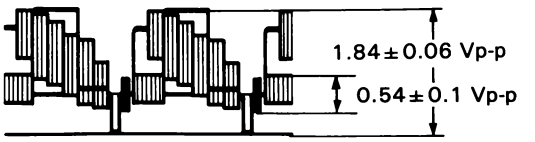
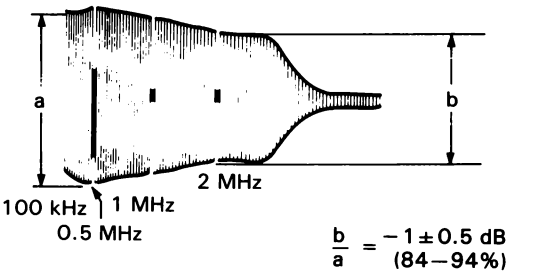
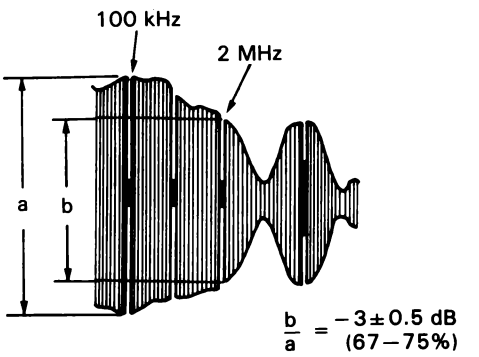
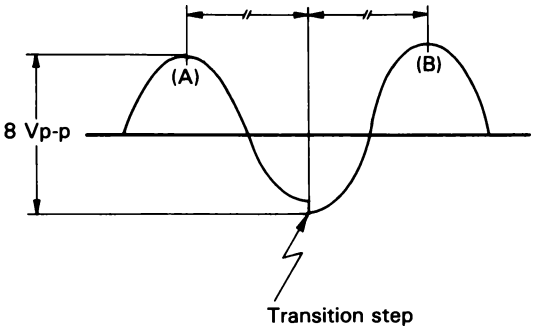


Fig. 3.6.9

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
10	0.5 H Delayed Jump DET	TP432 (VCO OUTPUT)	R525 (0.5 H DET)	No Signal E-E (AUX)	1. Connect a jump wire between TP427 and TP431. 2. Adjust R525 to obtain 30 kHz ± 0.2 kHz.
11	REC FM Level	TP4 (REC FM)	R82 (REC FM)	Colour bar REC (LP mode)	1. Adjust R82 so that the level of the FM waveform 100% white component becomes 2.4 Vp-p as shown in Fig. 3.6.10.  A = 2.4 ± 0.1 Vp-p (LP) A = 3.7 ± 0.3 Vp-p (SP) **Fig. 3.6.10**
				Colour bar REC (SP mode)	2. Confirm that the level of the FM waveform 100% white component becomes 3.7 ± 0.3 Vp-p as shown in Fig. 3.6.10.
12	SP REC Colour	TP404 (PB COLOUR)	R71 (SP REC COLOUR)	MH-2 Colour bar PB Colour bar REC (SP mode) ↓ PB	1. Play back a colour bar segment of the alignment tape MH-2 and observe colour signal level. Adjust the TRACKING (R438) control ([04] A/S/M board/FRONT) for maximum level of the colour waveform and make a note of this as higher level of channel "A". 2. Record and playback a colour bar signal. During recording adjust R71 so that the higher level channel "B" becomes + 1 dB higher than "A" during playback as shown in Fig. 3.6.11. Note: Set the TRACKING (R438) control ([04] A/S/M board/FRONT) to the center click position. 3. Confirm that the channel difference is within 3 dB. Note: Playback the alignment tape, then playback a self-recorded tape, and confirm the absence of colour level reversal between channels.  **Fig. 3.6.11**

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
13	LP REC Colour & Balance	TP404 (PB COLOUR)	R75 (LP REC COLOUR)	MH-2 Colour bar PB Colour bar REC (LP mode) ↓ PB	1. Connect 220 Ω resistor between TP24 and TP27. 2. Playback a colour bar segment of the alignment tape MH-2 and observe colour signal level. Adjust the TRACKING (R438) control ([04] A/S/M board/FRONT) for maximum level of the colour waveform and make a note of channel "A". 3. Record and playback a colour bar signal. During recording, adjust R75 so that the higher level channel "B" becomes −2 dB $^{+0.5}_{-0}$ dB below "A" during playback as shown in Fig. 3.6.11. Note: Set the TRACKING (R438) control ([04] A/S/M board/FRONT) to the center click position. 4. Confirm that the channel difference is within 3 dB. Note: Play back the alignment tape, then playback a self-recorded tape, confirm the absence of colour level reversal between channels.
14	Converter Balance	TP401 (CONV BAL)	R459 (CONV BAL)	Colour bar REC (SP mode) ↓ PB	1. Connect an oscilloscope to TP401. 2. Supply a colour bar signal, record and then playback. 3. Adjust R459 for minimum leakage of the 5.06 MHz component as shown in Fig. 3.6.12.  Minimum **Fig. 3.6.12**
15	Noise Reduction	TP23 (PB Y)	R140 (NOISE BALANCE)	Colour bar REC (SP mode) ↓ PB	1. Connect 0.022 μF ceramic capacitor between TP23 and GND. 2. Adjust R140 to minimize the waveform as shown in Fig. 3.6.13. INCORRECT CORRECT **Fig. 3.6.13**

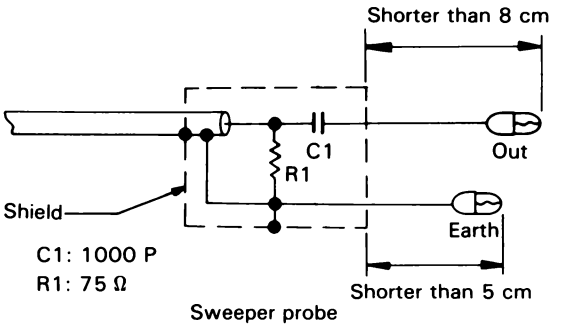
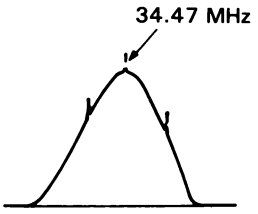
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
16	PB Y & Colour Level	TP10 (VIDEO OUT)	R135 (PB Y) R59 (PB COLOUR)	Colour bar REC (SP mode) ↓ PB	1. With a 75 Ω load at VIDEO OUT. 2. Ajust R135 for a luminance signal level of 1.84±0.06 Vp-p. 3. Adjust R59 for a burst level of 0.54±0.1 Vp-p as shown in Fig. 3.6.14.  **Fig. 3.6.14**
17	Sharpness Preset	TP21 (SHARP-NESS PRESET)	R43 (SHARP-NESS PRESET)	Video sweep E-E	1. Connect an oscilloscope to TP21. 2. Set the PICTURE SHARPNESS (R283) control ([04] A/S/M board/FRONT) to the center click position and connect a sweep generator to VIDEO IN. 3. Adjust R43 so that the 2 MHz level becomes −1±0.5 dB (84−94%) with reference to 100 kHz as shown in Fig. 3.6.15.  **Fig. 3.6.15**
18	REC FM EQ	TP10 (VIDEO OUT)	R29 (SP PB EQ)	Video sweep REC (SP mode) ↓ PB	1. Connect an oscilloscope to TP10. 2. Set the SHARPNESS (R283) control ([04] A/S/M board/FRONT) to the center click position and connect a sweep generator to VIDEO IN. 3. Adjust R29 so that the 2 MHz level becomes −3±0.5 dB (67−75%) with reference to 100 kHz as shown in Fig. 3.6.16. 4. Confirm that the channel difference is within 1.5 dB. 5. If the above conditions are not fulfilled, adjust the higher level channel to match the lower by using R21 and R22 ([16] PRE AMP board).  **Fig. 3.6.16**

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
19	SECAM AMP & Detect	TP410 (SECAM DET 1)	R437 (SECAM DET) L407 ($^1/_2$ fH TUNING)	SECAM Colour bar E-E	1. Connect an oscilloscope to TP410. 2. Adjust R437 to obtain 8 Vp-p. 3. And adjust L407 so that the transition step becomes at the center of (A) and (B) as shown in Fig. 3.6.17.  **Fig. 3.6.17**

3.7 TIMER CIRCUIT ([09] TIMER board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Timer Control Clock	TP2 (CLOCK)	C11 (CLOCK)	No signal E-E	1. Adjust C11 for 4.194304 MHz.

3.8 TUNER/IF CIRCUIT ([07] TUNER/IF board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
• Equipment required 1. Oscilloscope 2. IF sweep signal generator with suitable markers (VIF, SIF, etc.) 3. DC power supply — For IF AGC bias (approx. 5 V variable) 4. Sweeper probe (sweep signal supply cable) as shown in Fig. 3.8.1					 **Fig. 3.8.1**
1	LLD Coil	TP12B (VIDEO DET OUT)	T3 (LLD)	Sweep generator (38.9 MHz)	1. Set the IF sweep signal generator level so that amplitude of the signal becomes 25 mV rms. Connect a DC power supply to TP-14 (AGC) and adjust the DC power supply to obtain 1 Vp-p at TP-12B. 2. Adjust T3 (LLD coil) so that the VIDEO marker 38.9 MHz becomes maximum level.
2	Sound Trap Coil	TP12B (VIDEO DET OUT)	T2 (SOUND TRAP)	Sweep generator (33.4 MHz)	1. In the same condition as above item 3.8.1. Adjust T2 so that the SOUND marker 33.4 MHz becomes minimum level.
3	Adjacent Trap	TP12B (VIDEO DET OUT)	L3 (ADJACENT TRAP)	IF Sweep	1. Connect an IF sweep generator to the test point in the Front end. 2. 32.4 MHz signal that is modulated at 400 Hz is supplied to test point in the Front end. 3. Adjust L3 so that the waveform level at TP12B becomes minimum when connecting between pins of T3 (LLD coil).
4	SAW Coil	TP12B (VIDEO DET OUT)	T1 (SAW Coil)	Sweep generator (34.47 MHz)	1. Connect a jump wire between pins of T3 (LLD coil). In the same condition as item 3.8.1. Adjust T1 so that the 34.47 MHz becomes maximum level.  **Fig. 3.8.2**
5	IF Coil	TP12B (VIDEO DET OUT)	IF Coil (Front end)	Sweep generator (38.9 MHz)	1. Connect a jump wire between pins of T3 (LLD coil). In the same condition as item 3.8.1. Adjust IF coil in the Front end so that the 38.9 MHz becomes maximum level.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
6	Multiplexer Coil (EB/EG model)	CN9 (IF OUT)	T6 (Multiplexer Coil)	IF Sweep	1. Connect an IF sweep generator to the test point in the Front end. 2. Connect a jump wire between pins of T3 (LLD coil). In the same condition as item 3.8.1. Adjust T6 so that the 37.4 MHz becomes minimum level.
7	AFC Coil	Pin 24 of IC1	T4 (AFC Coil)	Sweep generator (38.9 MHz)	1. Set the IF sweep signal generator level so that amplitude of the signal becomes 8.5 mV rms. Disconnect a jump wire from T3 (LLD coil). 2. Connect a DC power supply to TP-14 (AGC). Adjust the DC power supply to the point just before waveform (S curve) is saturated. At this time, adjust T4 so that the 38.9 MHz level becomes 6.0 V as shown in Fig. 3.8.3.
8	RF AGC	IF terminal (Front end)	R17 (RF AGC)	Colour bar TV channel signal generator	1. Supply a colour bar signal on a channel 7 from a TV channel signal generator to ANT IN and select the channel corresponding to the generator. 2. First adjust R17 for maximum output from the tuner IF terminal, then again adjust R17 for −10 dB again.
9	Colour Level	TP12A (VIDEO OUT)	R35 (COLOUR LEVEL)	Colour bar TV channel signal generator	1. Supply a colour bar signal on a channel 7 from a TV channel signal generator to ANT IN and select the channel corresponding to the generator. 2. With AFC SW ON, adjust R35 to satisfy as shown in Fig. 3.8.4.
10	Audio Output Level (E model)	TP21 (AUDIO OUT)	R98 (AUDIO LEVEL)	Colour bar 1 kHz audio RF signal	1. Supply a colour bar signal and 1 kHz (± 50 kHz DEV) audio RF signal on a channel 7 from a TV channel signal generator to ANT IN and select the channel corresponding to the generator. 2. Adjust R98 for −17 ± 2 dBs.

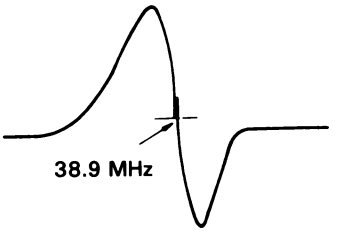


Fig. 3.8.3

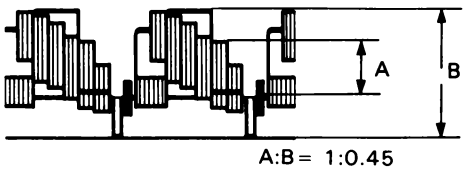
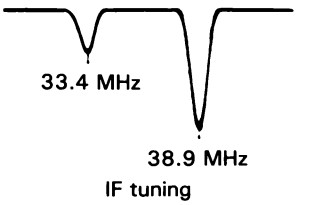
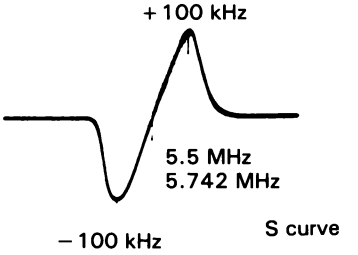
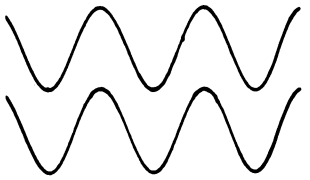
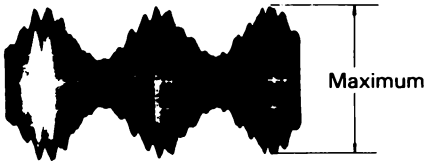
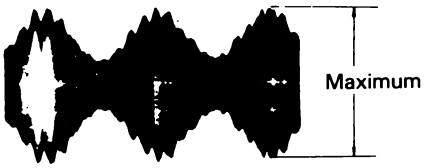
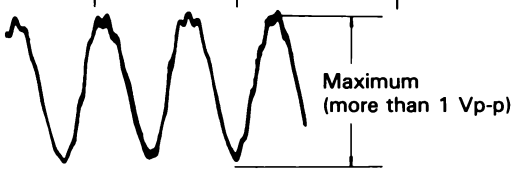
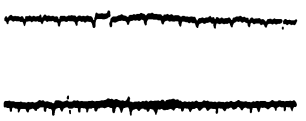


Fig. 3.8.4

3.9 DEMODULATOR CIRCUIT ([24] DEMODULATOR board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
• **Equipment required** 1. Audio multiplex TV signal generator 2. Sweeper-marker ("Swemar") generator (VIF and SIF) 3. Oscilloscope (dual-trace) 4. DC power supply (2 sets)					
1	Low Level Detector & Matching Trans.	TP803	T802 (LOW LEVEL DETECTOR) T801 (MATCHING TRANS)	Swemar generator (38.9 MHz)	1. Remove the DEMOD. board from the set. Connect the plus (+) side of an 11.7±0.05 V DC power supply to Conn. 31 (+12 V IN) and the minus (−) side to Conn. 34 (GND). 2. Connect the VIF output of swemar generator to the IF IN terminal. 3. Connect TP803 to the FROM TP terminal of the swemar generator and the V. SCOPE terminal of the generator to an oscilloscope. 4. Set the attenuation of the swemar generator to 40 dB (60 dBμ) and supply approx. 4 V DC to TP802. 5. Turn T802 to align the waveform peak with the 38.9 MHz point as shown in the figure. 6. Adjust T801 for maximum peak value at the 38.9 MHz point as shown in Fig. 3.9.1  **Fig. 3.9.1**
2	"S" curve	TP804 TP805		Swemar generator (5.5 MHz) Swemar generator (5.742 MHz)	1. Ground TP802 and connect the SIF output of the swemar generator to TP803. Connect TP804 to the FROM TP terminal of the generator and the V. SCOPE terminal of the generator to the oscilloiscope. 2. Set the attenuation of the swemar generator to 40 dB (60 dBμ) and observe the waveform on the oscilloscope. Confirm adequate linearity at 5.5 MHz± 30 kHz as shown in Fig. 3.9.2. 3. Similarly, connect TP805 to the FROM TP terminal of the generator and confirm adequate linearity at 5.742 MHz± 30 kHz as shown in Fig. 3.9.2.  **Fig. 3.9.2**

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	De-emphasis	TP819 TP821	R823 (CH2 DE-EMPHASIS)	Audio MPX TV signal generator (Audio and video, 100% mod.)	1. Connect IF output of audio MPX TV signal generator to the IF IN terminal. Supply a 97 dBμ IF input, video unmodulated 1 kHz audio signal at 100% modulation to both channels. 2. Connect a dual-trace oscilloscope to TP819 and TP821. 3. Adjust R823 for minimum phase difference as shown in Fig. 3.9.3
	 De-emphasis **Fig. 3.9.3**				
4	Stereo (L-R)	TP806	R815 (CH1 LEVEL)	Same as Item 3.	1. Connect an oscilloscope to TP806. 2. IF IN connection and supplies are the same manner as above 1 of Item 3. 3. Adjust R815 to minimize waveform peak-to-peak (p-p) value. At the optimum point, the frequency becomes 2 kHz at about 15 mVp-p as shown in Fig. 3.9.4.
	 Stereo **Fig. 3.9.4**				
5	Pilot Carrier Level-1	Pin 3 of IC805	T803 (PILOT CARRIER LEVEL-1)	Same as Item 3.	1. Connect an oscilloscope to pin 3 of IC805. 2. IF IN connection and supplies are the same manner as above 1 of Item 3. 3. Adjust T803 for maximum waveform peak-to-peak value. At this time, the pilot signal is the 54.7 kHz carrier with 50% modulation at 117.5 Hz as shown in Fig. 3.9.5
	 Pilot carrier-1 **Fig. 3.9.5**				
6	Pilot Tank	Pin 3 of IC805	TP804 (PILOT TANK)	Same as Item 3.	1. Connect an oscilloscope to pin 3 of IC805. 2. IF IN connection and supplies are the same manner as above 1 of Item 3. 3. Adjust T804 for maximum waveform peak-to-peak value as shown in Fig. 3.9.6.
	 **Fig. 3.9.6**				

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
7	Pilot Carrier Level-2	TP813	R838 (PILOT CARRIER LEVEL-2)	Same as Item 3. (Pilot: 2-tone mode)	1. Connect an oscilloscope to TP813. 2. IF IN connection and supplies are the same manner as above 1 of Item 3. 3. Adjust R838 for maximum waveform peak-to-peak value within the range of waveform stability as shown in Fig. 3.9.7. 4. Set the pilot signal for the 2-tone mode and confirm that the waveform is greater than 1 Vp-p.
					 Pilot carrier-2 **Fig. 3.9.7**
8	Stereo Separation	TP817 TP818	R836 (SEPARA-TION)	Same as Item 3. (Pilot: Stereo mode)	1. Same manner as above 1 of Item 3. Set the pilot signal for the stereo mode. With the L channel unmodulated, provide 1 kHz 100% modulation on the R channel. 2. Connect an oscilloscope to TP818 and adjust R836 for minimum waveform peak-to-peak value. At this time, confirm value of less than 80 mVp-p as shown in Fig. 3.9.8. 3. With the R channel unmodulated, provide 1 kHz 100% modulation on the L channel. 4. Connect an oscilloscope to TP817 and check for less than 80 mVp-p. If more than this value, again adjust R836. 5. Repeat the adjustments to obtain equal waveform levels at TP818 and TP817, while maintaining less than 80 mVp-p. At this point, if still out of specification, repeat the adjustments of the foregoing sequences Items 3, 4 and 8.
					 Stereo separation **Fig. 3.9.8**
9	LLD Buzz	TP817 TP818	T802 (LOW LEVEL DETECTOR)	Same as Item 3. (Pilot: 2-tone mode)	1. Same manner as above 1 of Item 3. Set the pilot signal for the 2-tone mode and supply a PAL crosshatch (87.5% modulation) signal without audio modulation. 2. Connect a dual-trace oscilloscope to TP817 and TP818. Observe that the range setting is adequately small. 3. Fine adjust T802 to simultaneously minimize pulse type buzz noise on both main and sub channels as shown in Fig. 3.9.9.
					 LLD buzz **Fig. 3.9.9**

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
10	Stereo Output Level	CN4−41 (L-ch) CN4−43 (R-ch)	R853 (L-ch OUTPUT LEVEL) R852 (R-ch OUTPUT LEVEL)	Same as Item 3. (Pilot: Stereo mode)	1. Same manner as above 1 of Item 3. Set the pilot signal for the stereo mode. 2. With the R channel unmodulated, provide 1 kHz 100% modulation on the L channel. 3. Adjust R853 for −17±0.5 dBs L channel output at connector 4−41, 4. Similarly, with the L channel unmodulated, provide 1 kHz 100% modulation on the R channel. 5. Adjust R852 for −17 dB±0.5 dBs R channel output at connector 4−43.

Audio Multiplex TV Signal Generator

Recommended Specifications

1. Signal Format	Based on CCIR-B
2. Frequency	
Video Carrier Fv	38.9 MHz
1st Sound Carrier fs_1	33.4 MHz
2nd Sound Carrier fs_2	33.1578125 MHz
3. Modulator	
Video	Crosshatch (black on white) V: 50 Hz; H: 15.625 kHz
Audio	Sinewave 1 kHz; CH-1 and CH-2 outputs switchable
4. Output	97 dB/μV(open)±2 dB fixed, BNC-R 75 Ω
5. P-S Ratio	S_1P − 13 dB±2 fixed S_2P − 20 dB±2 fixed
6. Modulation	
Video	87.5%±3 %
Audio	±30 kHz±2 kHz
7. Stereo Separation	Less than −40 dB
8. Pilot signal	
Carrier Frequency	54.6875 kHz±5 Hz synchronized type
Stereo	117.5 Hz AM50%
Dual	274.1 Hz AM50%

9. Sound Modulation Modes	S_1	S_2
Mono	Mono 1	Mono 2
Stereo	(L+R)/2	R
Dual	Mono 1	Mono 2
10. Functions	S_1	S_2
Mono (M)	100%	100%
Stereo (L,R)	(L+R)/2	R
(L)	L/2	—
(R)	R/2	R
(OFF)	—	—
Mult (S_1,S_2)	100%	100%
(S_1)	100%	0
(S_2)	0	100%
(OFF)	0	0
V. MOD (ON/OFF)		
11. Frequency Accuracy	Within $\pm 5 \times 10^{-5}$	
12. Spurious	Less than −50 dB	
13. Saw Filter	Self-contained	

SECTION 4
CHARTS AND DIAGRAMS

4.1 KEY TO PARAMETER INDICATIONS

4.1.1 Connections

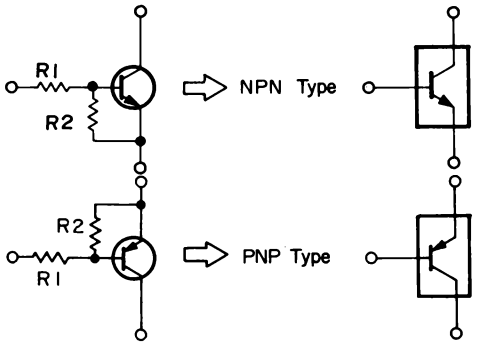
▣ : Connector
◯ : Board
▣ : Board in connector
⬭ : Connected pattern in the board.

4.1.2 Signal indications

COUNT UP : Active only at high.
$\overline{\text{COUNT DOWN}}$: Active only at low.

4.1.3 Digital transistor

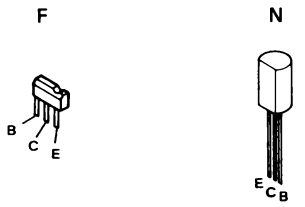
DIGITAL TRANSISTOR



RESISTOR VALUES

JUNCTION	Part No.	R1 (kΩ)	R2 (kΩ)
PNP	DTA114	10	10
	DTA124	22	22
	DTA144	47	47
	DTA144W	47	22
	DTA114Y	10	47
	DTA114T	10	OPEN
	DTA143T	4.7	OPEN
NPN	DTC114	10	10
	DTC124	22	22
	DTC144	47	47
	DTC144W	47	22
	DTC114Y	10	47
	DTC114T	10	OPEN
	DTC143T	4.7	OPEN

NOTE: An (additional) suffix letter may be used to indicate shape as follows.



The digital transistor includes built in resistors.
Both PNP and NPN types are used.
USES: INVERTER, INTERFACE, DRIVER CIRCUITS.

4.1.4 Signal flow in the schematic

——→ Recording signal path
– – – –→ Playback signal path
—·—·→ REC/PB signal path

4.1.5 Schematic diagram values

Unless otherwise specified,
1. All resistance values are in ohms (1/6 W, 1/8 W).
2. All capacitance values are in μF.
3. All inductance values are in μH.
4. All diodes are 1SS133.
5. Voltages are DC-measured with a digital voltmeter during recording mode (SP mode) and playback (SP mode) with alignment tape. Where voltages differ between recording and playback, the voltage during playback is shown in parentheses.
6. Waveforms (VIDEO System) are measured with a colour bar during recording (SP mode) and playback (SP mode) with alignment tape.
7. Waveforms (AUDIO System) are measured with 1 kHz (−20 dBs) during recording and playback with alignment tape (1 kHz).

4.1.6 Safety precaution

- **Shaded (▨) parts are critical for safety. Replace only with specified part numbers.**

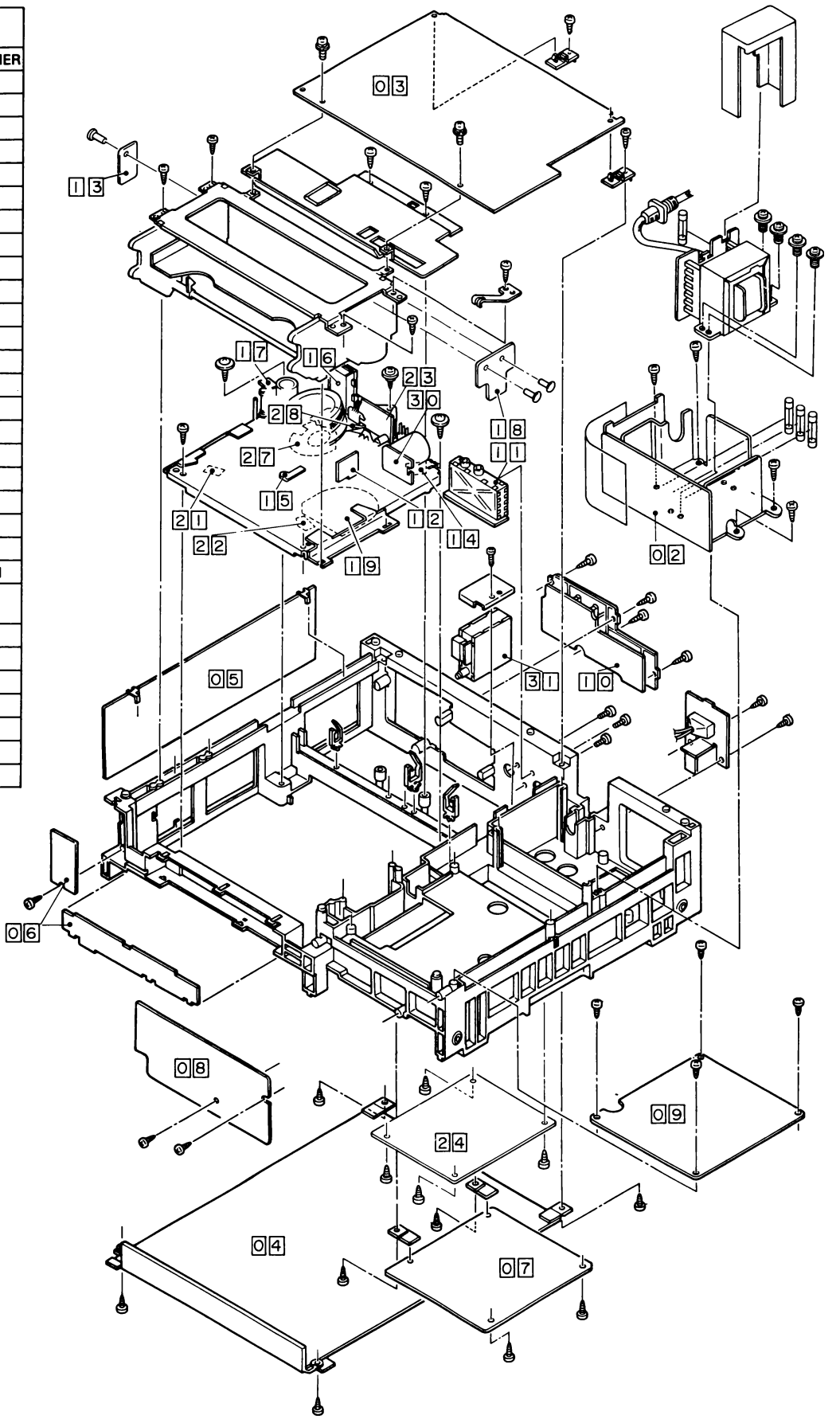
4.2 KEY TO ABBREVIATIONS

A	AC	: Alternating Current
	ACC	: Automatic Color Control
	A/CTL	: Audio/Control
	ADC	: Analog to Digital Converter
	ADD	: Adder
	ADJ	: Adjustment
	A DUB	: Audio Dubbing
	AE	: Audio Erase
	AEF	: Automatic Editing Function
	AFC	: Automatic Frequency Control
	AFT	: Automatic Fine Tuning
	AGC	: Automatic Gain Control
	AH	: Audio Head
	AHD	: Audio High Density Disk
	AL	: After Loading
	ALC	: Automatic Light Compensation Automatic Level Control
	ALM	: Alarm
	ALU	: Arithmetic Logic Unit
	AM	: Amplitude Modulation
	AMP	: Amplifier
	ANT	: Antenna
	APC	: Automatic Pedestal Control Automatic Phase Control
	APL	: Average Picture Level
	A/S/M	: Audio/Servo/Mechacon
	ASS'Y	: Assembly
	ATT	: Attenuator
	AUD	: Audio
	AUTO	: Automatic
	AUX	: Auxiliary
B	B	: Base
	BAL	: Balance
	BATT	: Battery
	BBD	: Bucket Brigade Device
	BCD	: Binary Coded Decimal
	BEG	: Beginning
	BFP	: Burst Flag Pulse
	BIT	: Binary Digit
	BLK	: Black, Blanking
	BLU	: Blue
	BNC	: Bayonet Connector
	BOT	: Beginning of Tape
	BPF	: Bandpass Filter
	BRK	: Brake
	BRN	: Brown
	BRT	: Brightness
	BT	: Band Tuning
	BUFF	: Buffer
	BW or B/W	: Black and White
C	C	: Capacitance, Collector, Color
	CAL	: Calibration
	CAP	: Capstan, Capacitor
	CAR	: Carrier
	CARR	: Carrier
	CASS	: Cassette
	CC	: Cassette Compartment
	CCD	: Charge Coupled Device
	CCT	: Circuit
	CdS	: Cadmium Sulphide
	CD	: Count Down
	CE	: Chip Enable
	CF	: Ceramic Filter, Color Frame
	CH	: Channel
	CHG	: Charge
	CHROMA	: Chrominance
	CLK	: Clock
	CLR	: Clear
	CMD	: Command
	CMOS	: Complementary Metal Oxide Semiconductor
	CNT	: Count, Counter
	COL	: Color
	COM	: Common
	COMB	: Combination Comb Filter
	COMP	: Comparator Composite Compensation
	CONN	: Connector
	CONV	: Converter
	CP	: Circuit Protector Clamp Pulse
	CPC	: Capstan Phase Control
	CPU	: Central Processing Unit
	CTC	: Crosstalk Cancel
	CTL	: Control
D	D	: Drum, Digital, Diode, Drain
	DAC	: Digital to Analog Converter
	dB	: Decibel
	DC	: Direct Current
	DD	: Direct Drive
	DEC	: Decoder
	DEMOD	: Demodulator
	DEMUX	: Demultiplexer
	DET	: Detector
	DEV	: Deviation
	DFRS	: Drum Free Running Stop
	DG	: Differential Gain
	DIF	: Differential
	DISCR	: Discriminator
	DL	: Delay Line
	DOC	: Dropout Compensator
	DOD	: Drop Out Detector
	DP	: Differential Phase
	DPC	: Drum Phase Control
	DYAC	: Dynamic Aperture Control
E	E	: Edit, Emitter
	EDP	: Electronic Data Processing
	E-E	: Electric to Electric
	EF	: Emitter-Follower
	EMP	: Emphasis
	EN	: Enable
	ENC	: Encoder
	ENV	: Envelope
	EOT	: End of Tape
	EP	: Extended Play
	EQ	: Equalizer
	ES	: Electronic Switch
	ESNS	: End Sensor
	EXP	: Expander
	EXT	: External
F	F	: Farad, Fuse
	F ADV	: Frame Advance
	FDP	: Fluorescent Display Panel
	FE	: Full Erase
	FET	: Field Effect Transistor
	FF	: Fast Forward Flipflop
	FG	: Frequency Generator
	FM	: Frequency Modulation
	FMA	: FM Audio
	FR	: Full Recording, Frame, Fusible Resistor
	FREQ	: Frequency
	F-V CONV	: Frequency to Voltage Converter
	FWD	: Forward
	FWD S	: Forward Search
G	G	: Green, Gate, Grid
	GEN	: Generator
	GND	: Ground
	GRN	: Green
	GRY	: Gray
H	H	: High, Henry, Hour
	HBF	: Horizontal Burst Flag
	HD	: Horizontal Drive
	HG	: Hall Generator
	HPF	: Highpass Filter
	Hz	: Herz

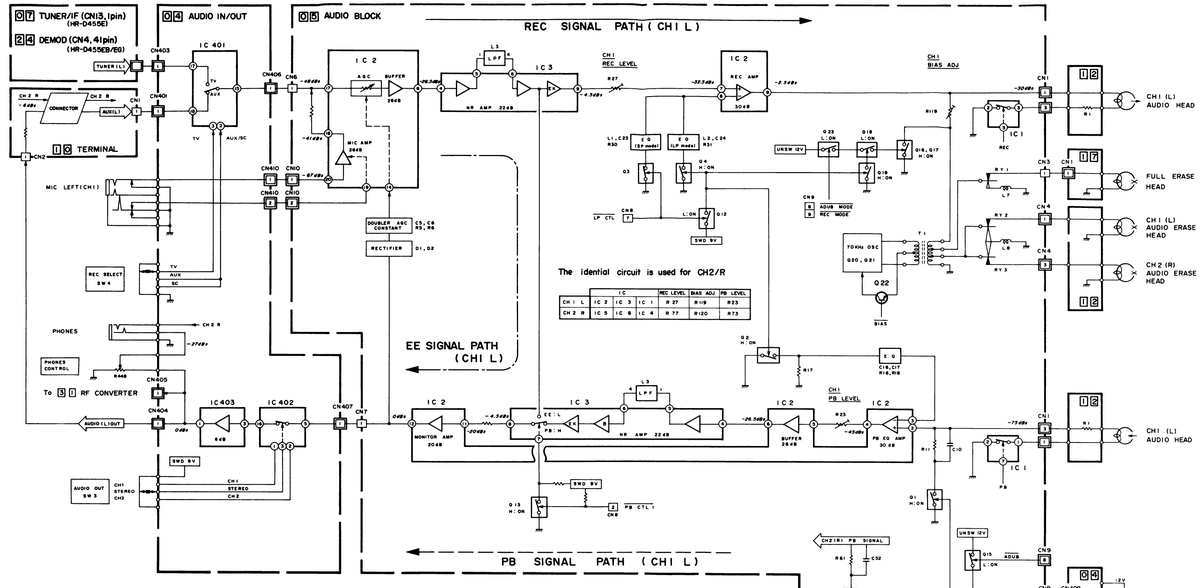
I	IC	: Integrated Circuit
	ID	: Identification (Pulse)
	IF	: Intermediate Frequency
	IFR	: Infrared
	IFT	: Intermediate Frequency Transformer
	IND	: Indicator
	INH	: Inhibit
	INS	: Insert
	INT	: Internal, Interrupt
	INV	: Inverter
	I/O	: Input/Output
	IR	: Infrared
L	L	: Low, Left
	LCD	: Liquid Crystal Display
	LED	: Light Emitting Diode
	LIM	: Limiter
	LIN	: Linearity
	LOAD	: Loading (Cassette)
	LP	: Long Play
	LPF	: Lowpass Filter
	LSB	: Lower Sideband
M	M	: Motor, Mega
	MAX	: Maximum
	MDA	: Motor Drive Amplifier
	MECHACON	: Mechanism Control
	MIC	: Microphone
	MIN	: Minimum
	MIX	: Mixer, Mixing
	MMV	: Monostable Multivibrator
	MNOS	: Metal Nitride Oxide Semiconductor
	MOD	: Modulation, Modulator
	MODEM	: Modulator-Demodulator
	MON	: Monitor
	MOS	: Metal Oxide Semiconductor
	MPX	: Multiplexer, Multiplex
	MS	: Mode Select
	MUT	: Muting
N	NAND	: Not-And
	NC	: Not Connected, Normally Closed
	NFB	: Negative Feedback
	NLN	: Non-Linear
	NO	: Normally Open
	NOR	: Normal, Not-Or
	NR	: Noise Reduction
O	OP	: Operation
	OPAMP	: Operational Amplifier
	ORN	: Orange
	OSC	: Oscillator
P	PB	: Playback
	PC	: Photocoupler, Pulse Counter
	PCM	: Pulse Code Modulation
	PG	: Pulse Generator
	PGM	: Program
	PI	: Photo Interrupter
	PIF	: Picture Intermediate Frequency
	PLA	: Programmable Logic Array
	PLL	: Phase Locked Loop
	POS	: Position
	p-p	: Peak-to-Peak
	PR	: Pinch Roller
	PREAMP	: Preamplifier
	PRL	: Preroll
	P/S	: Pause/Still
	PSC	: Pulse Swallowing Control
	PU	: Pickup
	PUT	: Programmable Unijunction Transistor
	PWB	: Printed Wiring Board
	PWM	: Pulse Width Modulation
	PWR	: Power
Q	Q	: Quality Factor
R	R	: Red, Right
	RA	: Resistor Array
	RAM	: Random Access Memory
	REC	: Recording
	REF	: Reference
	REG	: Regulated, Regulator
	REM	: Remote
	REMOCON	: Remote Control (Unit)
	REV	: Reverse
	REV S	: Reverse Search
	REW	: Rewind
	RF	: Radio Frequency
	ROM	: Read Only Memory
	R/P	: Record/Playback
	RPT	: Repeat
	RS FF	: RS Flipflop
	RST	: Reset
	RT	: Rotary Transformer
	RUN	: Running
	RY	: Relay
S	SAW	: Sawtooth, Surface Acoustic Wave
	SC	: Subcarrier, Simulcast
	SCH	: Search
	SEL	: Select, Selector
	SENS	: Sensor
	SEP	: Separator
	SF	: Source Follower
	SFF	: Short Fast Forward
	SIF	: Sound Intermediate Frequency
	SN	: Signal to Noise Ratio
	SOL	: Solenoid
	SOS	: Sound on Sound
	SP	: Standard Play
	SR	: Supply Reel
	SREV	: Search Reverse
	SREW	: Short Rewind
	S/S	: Slow/Still
	SSG	: Sync Signal Generator
	SSNS	: Start Sensor
	STD	: Strobe Data, Standard
	SUP	: Supply
	SW	: Switch
	SWD	: Switched
	SYNC	: Synchronization
	SYSCON	: System Control
T	TAL	: Tally
	TBC	: Time Base Corrector
	TC	: Tension Control, Time Code
	TEN	: Tension
	TF	: Thermal Fuse
	TIM	: Timing
	TK	: Tracking
	TNR	: Tuner
	TP	: Test Point
	TPZD	: Trapezoid
	TR	: Transistor, Trimmer
	TRANS	: Transformer
	T/T	: Tuner/Timer
	TU	: Take-up
U	UL	: Unloading
	UNREG	: Unregulated
	UNSW	: Unswitched
V	V	: Vertical, Volt
	VACT	: Video Action
	VCO	: Voltage Controlled Oscillator
	VD	: Vertical Drive
	VIF	: Video Intermediate Frequency
	VLT	: Violet
	VR	: Variable Resistor
	VS	: Video and Sync
	VSCH	: Variable Search
	V/T	: Video/Television
	V/U	: VHF/UHF
	VXO	: Variable Crystal Oscillator
W	W	: Watt
	WARN	: Warning
	W & D	: White and Dark
	WHT	: White
	WV	: Working Voltage
X	XTAL	: Crystal
Y	Y	: Luminance
	YEL	: Yellow

4.3 CIRCUIT BOARDS LOCATION

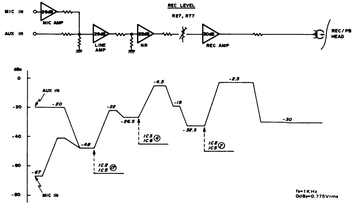
Board No.	Board Name
01	POWER TRANSFORMER
02	REGULATOR
03	VIDEO
04	A(In/Out)/S/M
05	AUDIO
06	OPERATION
07	TUNER/IF
08	DISPLAY
09	TIMER
10	TERMINAL
11	MIX BOOSTER
12	A/CTL HEAD
13	END SENSOR
14	LOADING SENSOR
15	LED
16	PREAMP
17	FULL ERASE HEAD
18	CASSETTE HOUSING
19	CAPSTAN MOTOR
20	–
21	SUPPLY SENSOR
22	TAKE-UP SENSOR
23	DRUM MOTOR CONN
24	DEMODULATOR (EB/EG only)
25	–
26	–
27	DRUM FG
28	DRUM MOTOR
29	–
30	MODE CTL MOTOR
31	RF CONVERTER



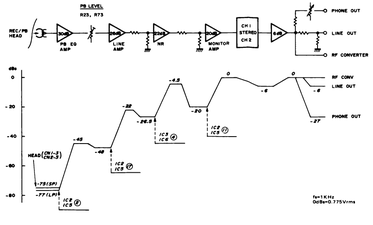
4.4 AUDIO BLOCK DIAGRAM



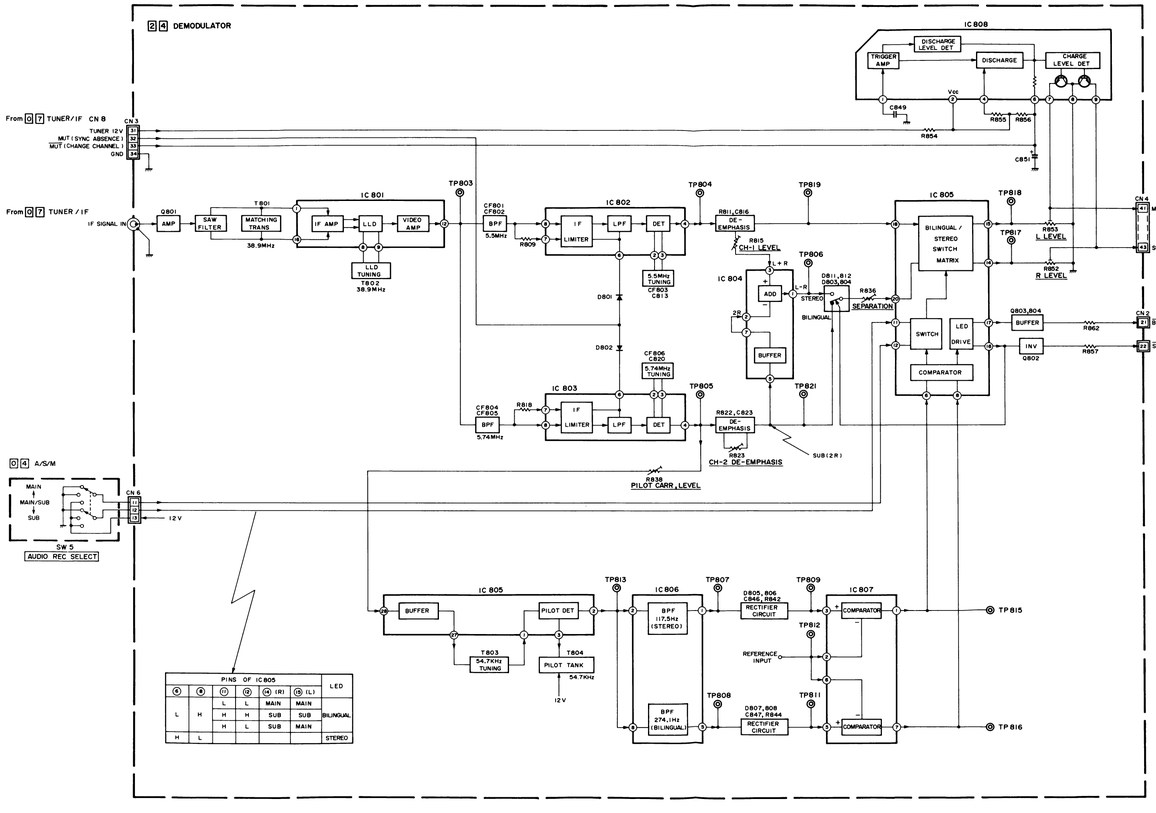
AUDIO LEVEL DIAGRAM (REC MODE)



AUDIO LEVEL DIAGRAM (PB MODE)

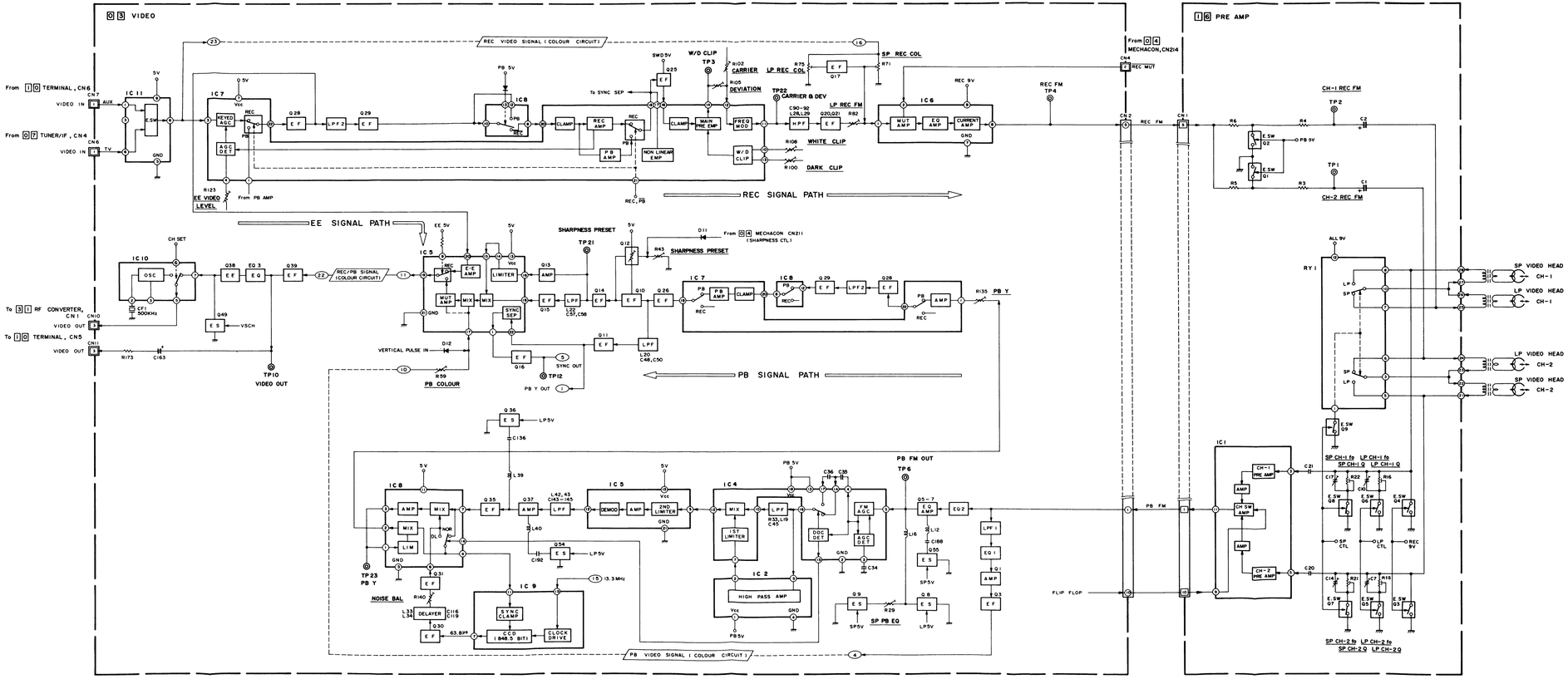


4.5 DEMODULATOR BLOCK DIAGRAM

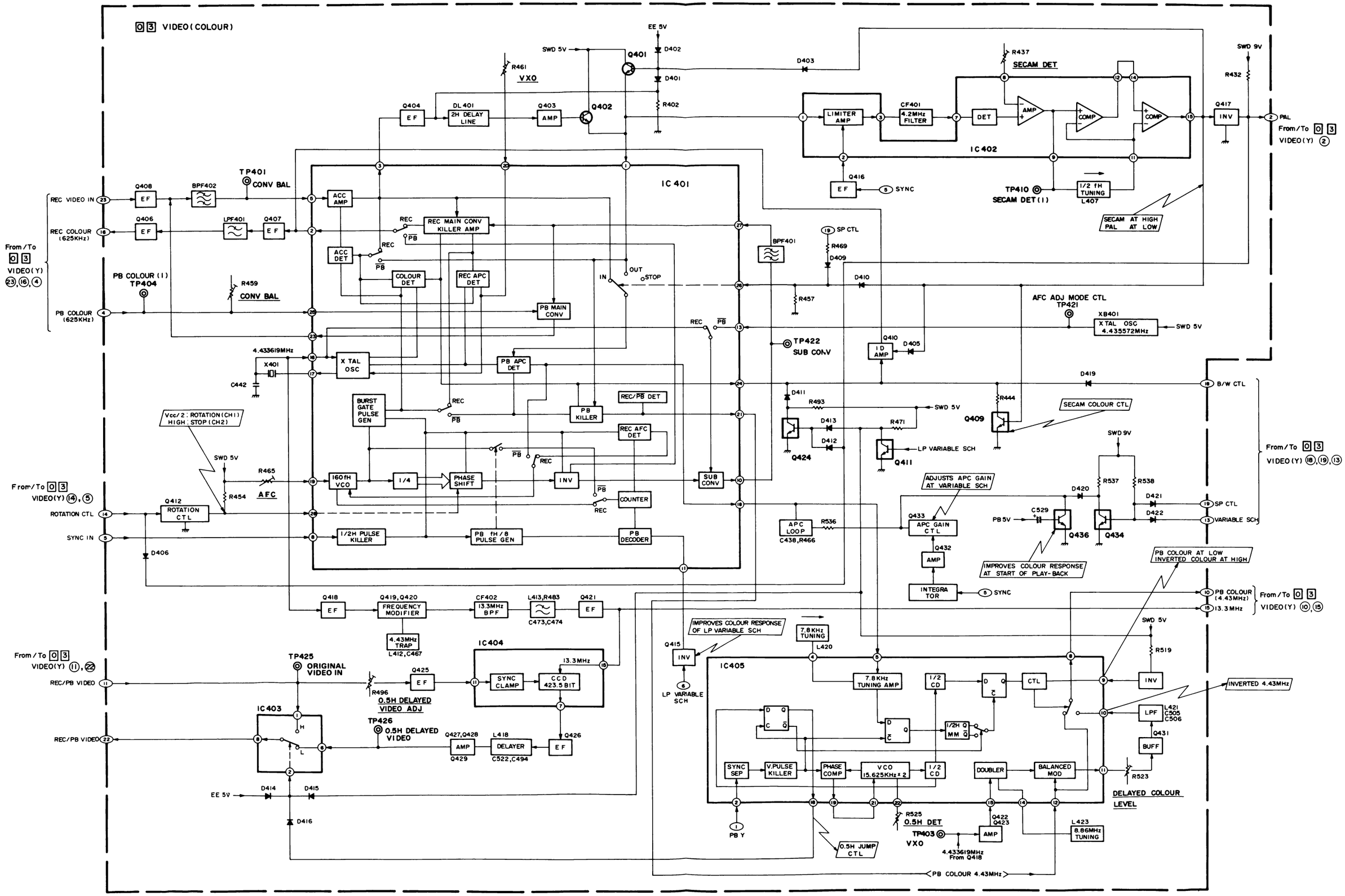


4.6 VIDEO BLOCK DIAGRAMS

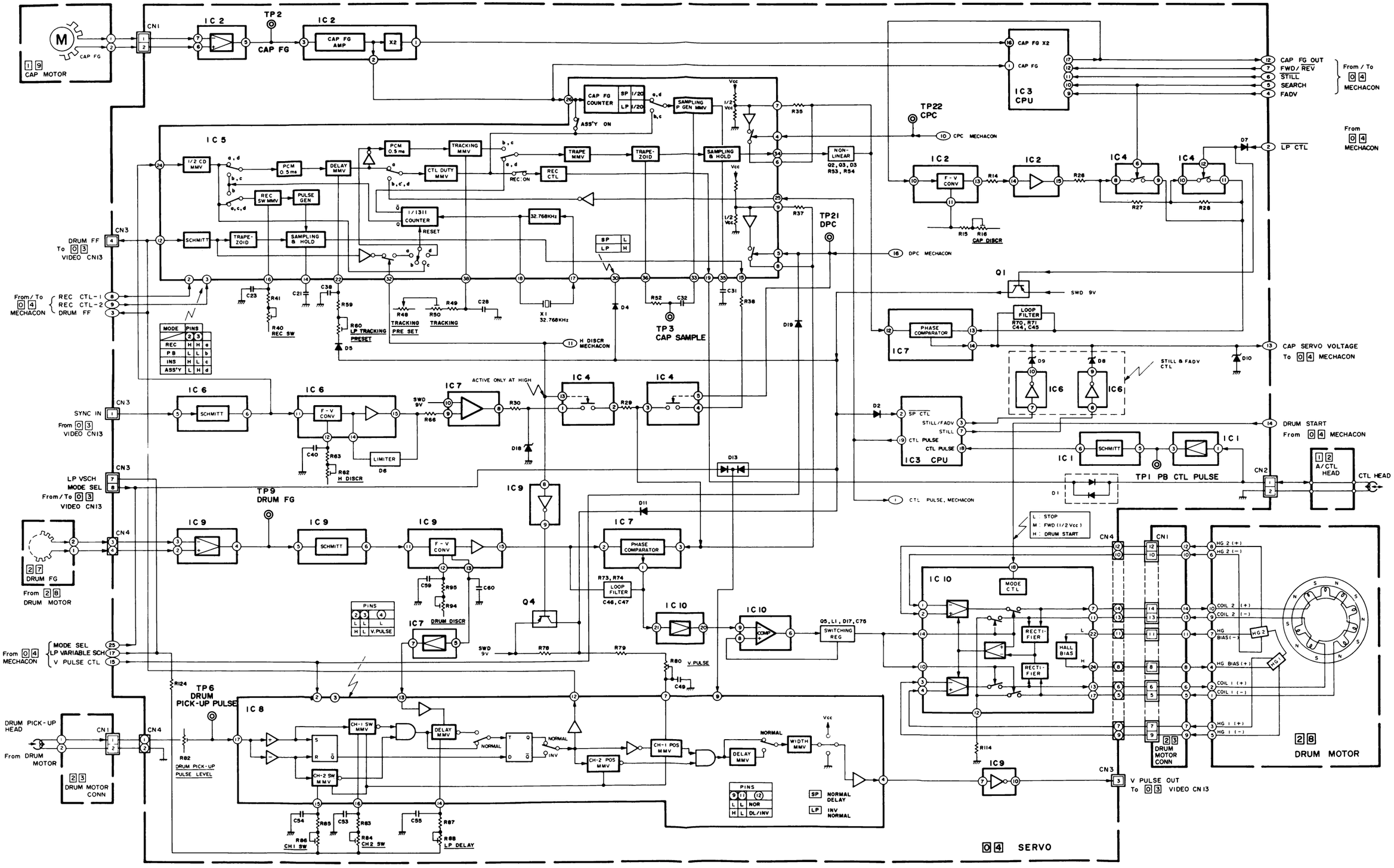
4.6.1 Luminance signal system



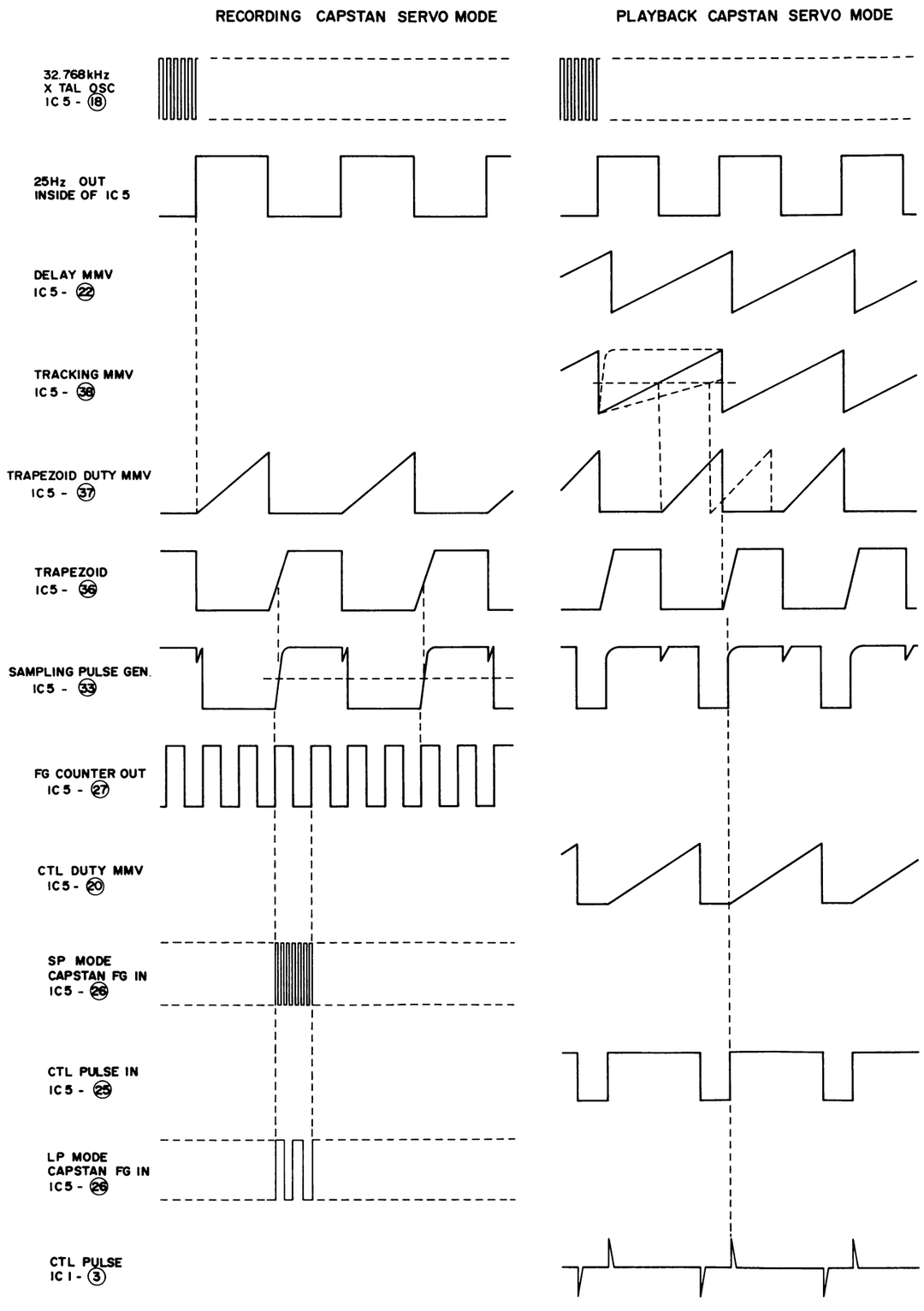
4.6.2 Colour signal system

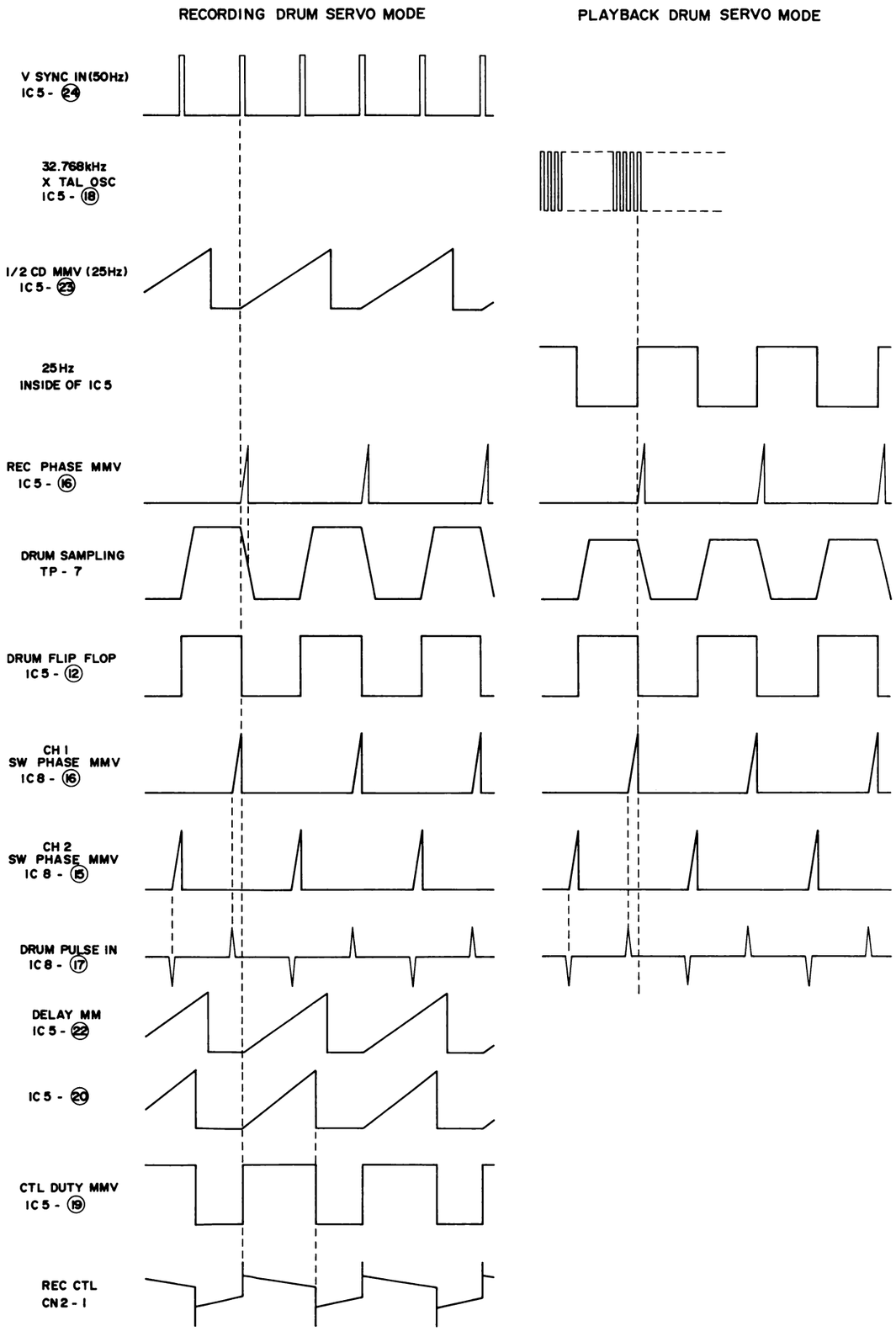


4.7 A/SERVO/M BLOCK DIAGRAM



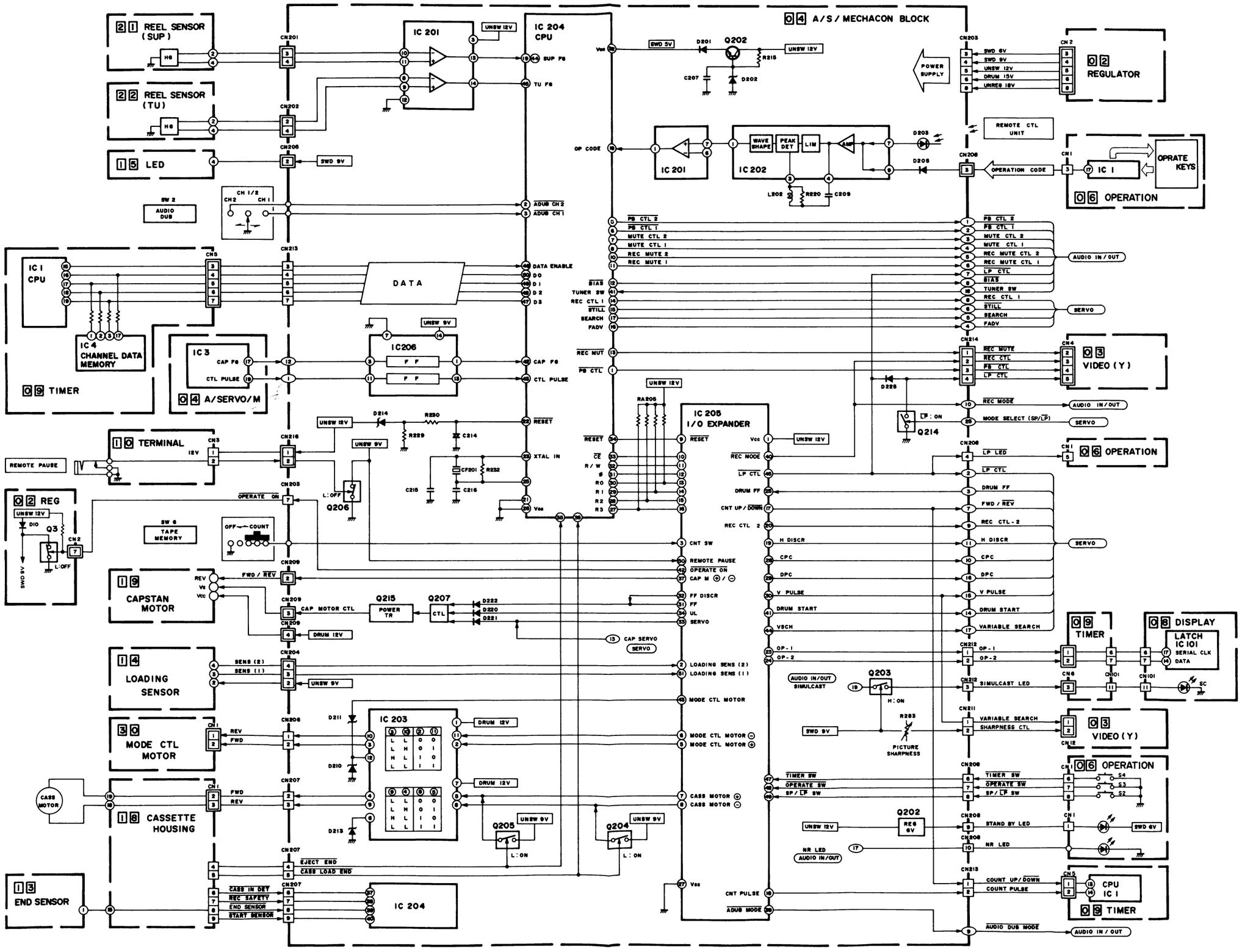
4.8 CAPSTAN AND DRUM SERVO TIMING CHARTS


RECORDING CAPSTAN SERVO MODE
PLAYBACK CAPSTAN SERVO MODE
32.768kHz X TAL OSC IC5 - 18
25Hz OUT INSIDE OF IC5
DELAY MMV IC5 - 22
TRACKING MMV IC5 - 38
TRAPEZOID DUTY MMV IC5 - 37
TRAPEZOID IC5 - 36
SAMPLING PULSE GEN. IC5 - 33
FG COUNTER OUT IC5 - 27
CTL DUTY MMV IC5 - 20
SP MODE CAPSTAN FG IN IC5 - 26
CTL PULSE IN IC5 - 25
LP MODE CAPSTAN FG IN IC5 - 26
CTL PULSE IC1 - 3

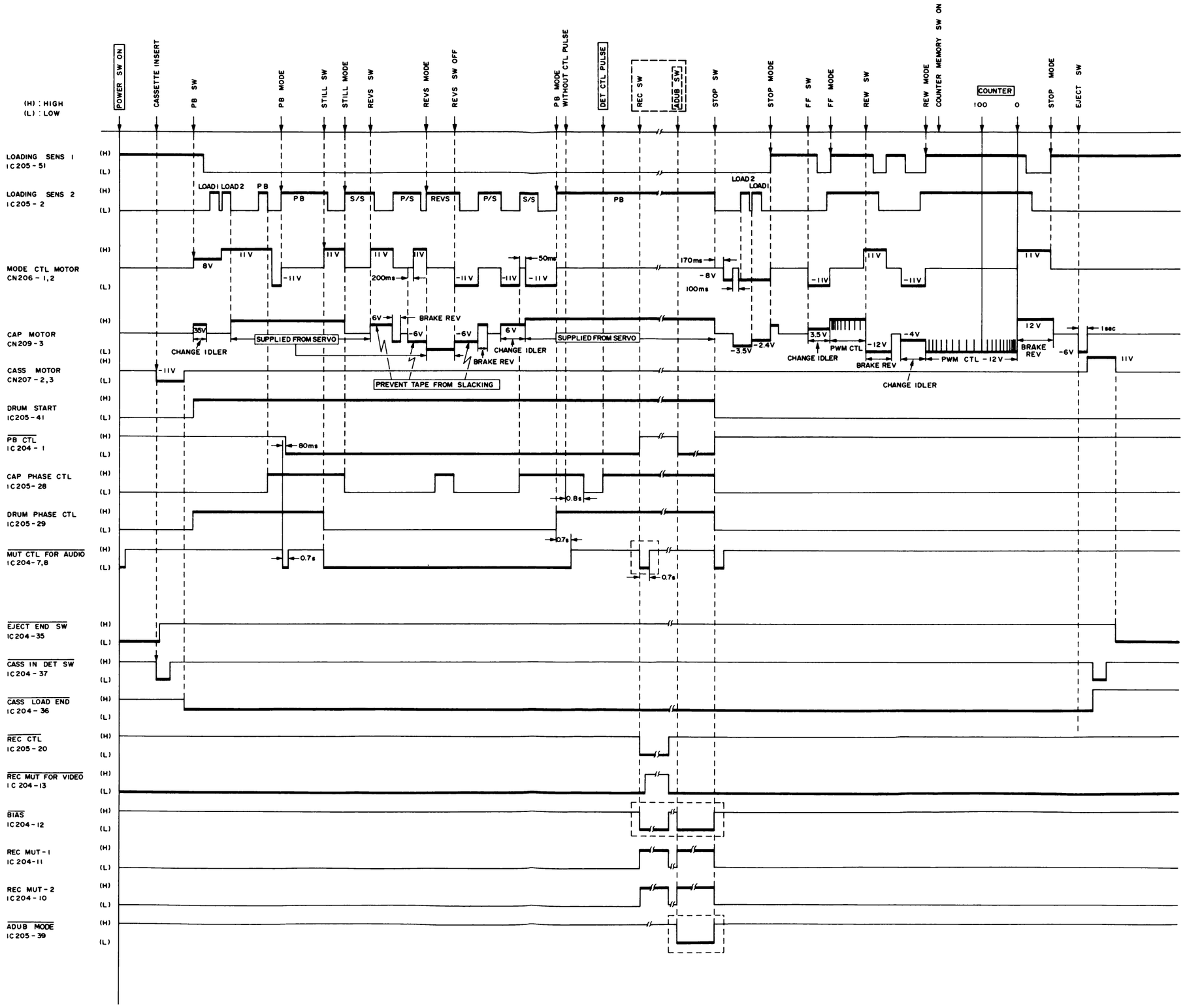

RECORDING DRUM SERVO MODE
PLAYBACK DRUM SERVO MODE
V SYNC IN(50Hz) IC5 - 24
32.768kHz X TAL OSC IC5 - 18
1/2 CD MMV (25Hz) IC5 - 23
25Hz INSIDE OF IC5
REC PHASE MMV IC5 - 16
DRUM SAMPLING TP - 7
DRUM FLIP FLOP IC5 - 12
CH 1 SW PHASE MMV IC8 - 16
CH 2 SW PHASE MMV IC8 - 15
DRUM PULSE IN IC8 - 17
DELAY MM IC5 - 22
IC5 - 20
CTL DUTY MMV IC5 - 19
REC CTL CN2 - 1

4-9

4.9 A/S/MECHACON BLOCK DIAGRAM

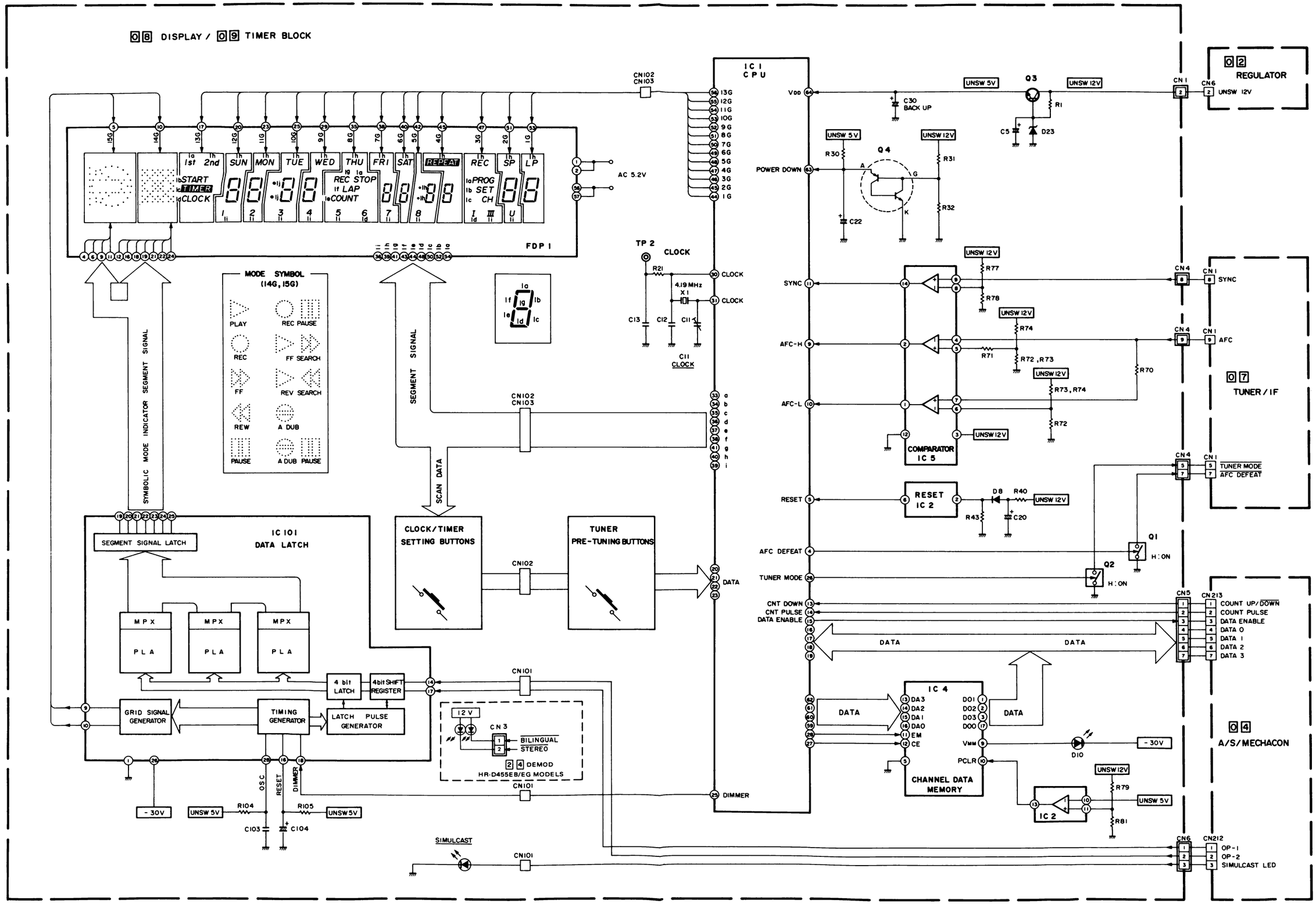


4.10 A/S/MECHACON TIMING CHARTS



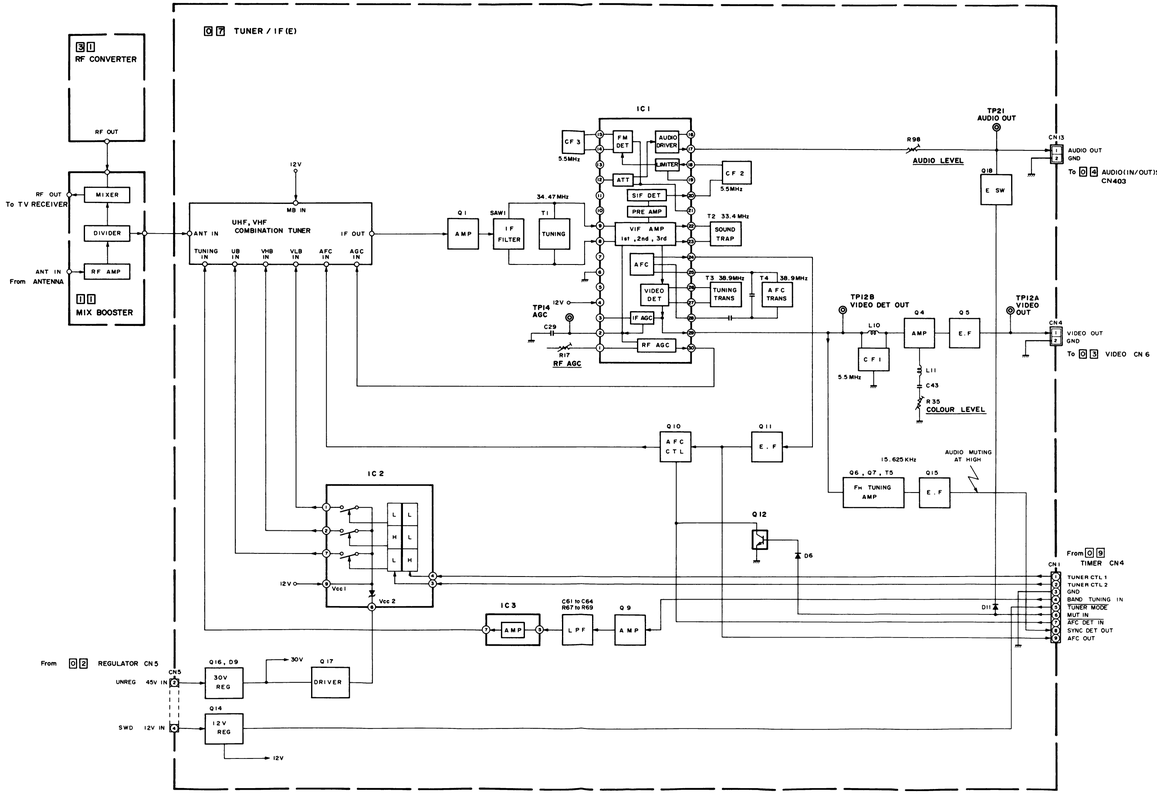
4-11

4.11 DISPLAY/TIMER BLOCK DIAGRAM

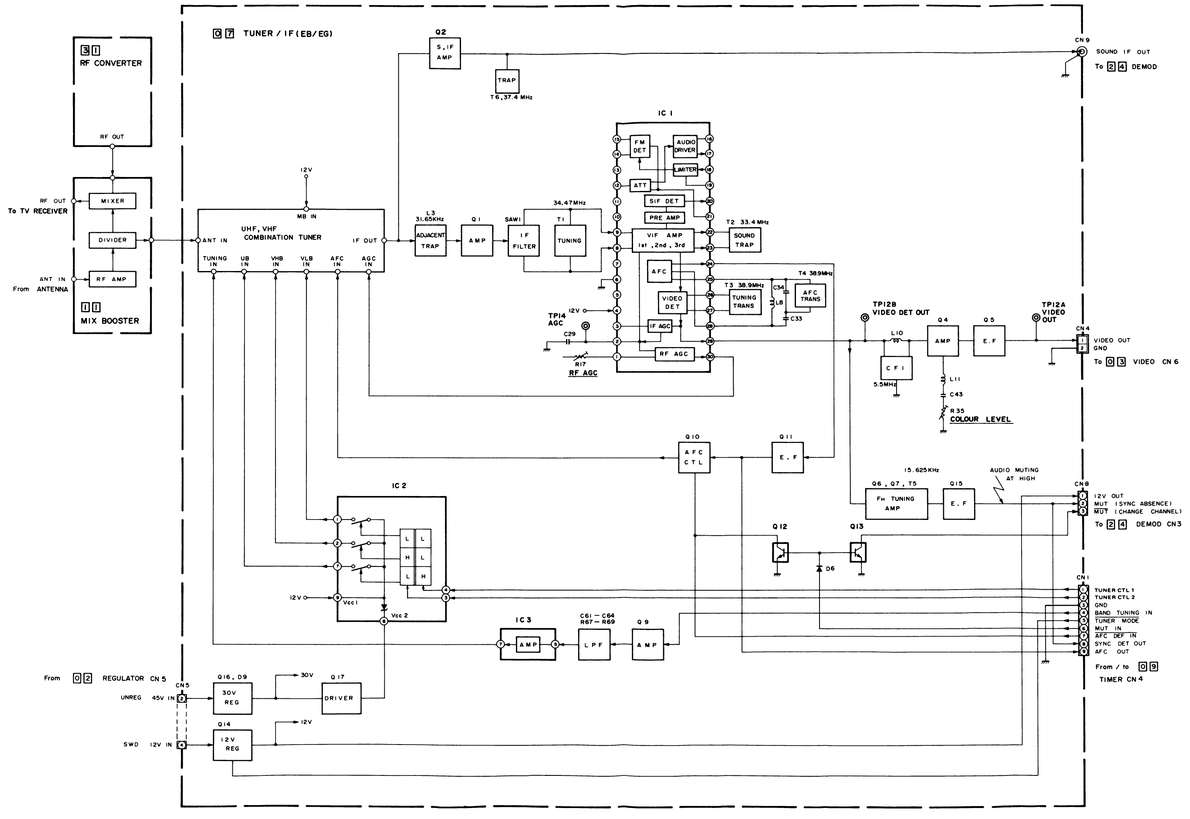


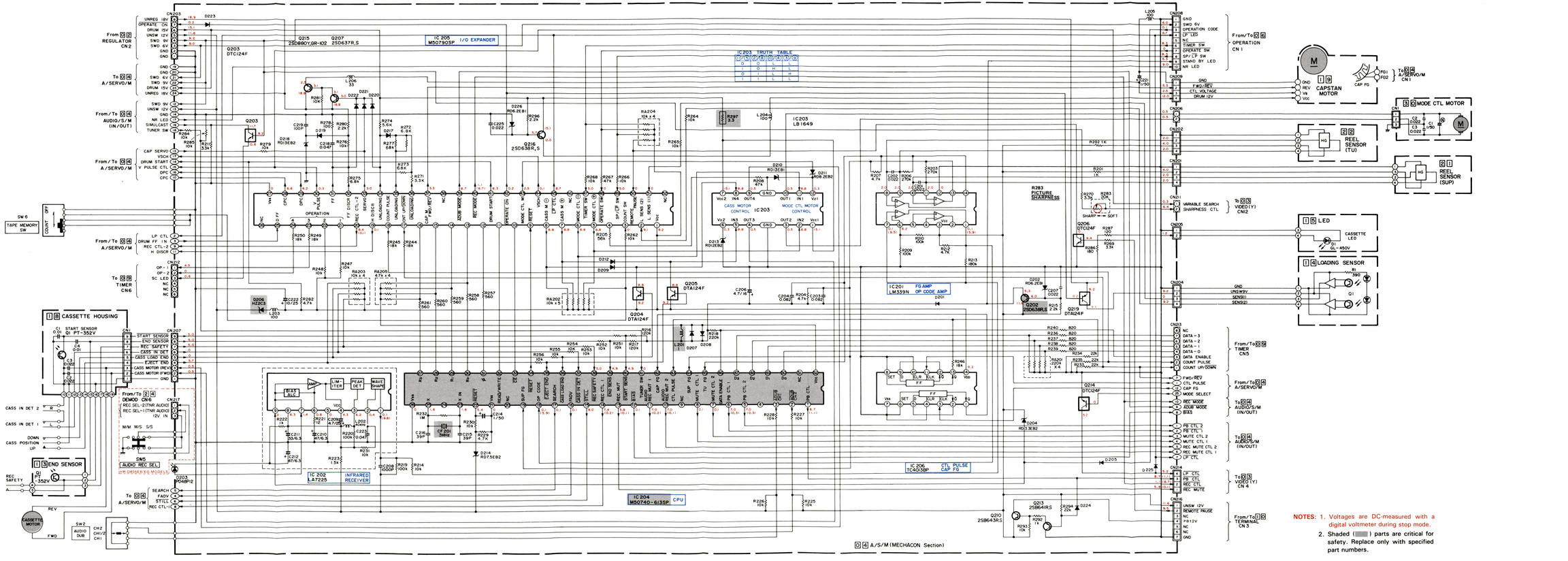
4.12 TUNER /IF BLOCK DIAGRAMS

4.12.1 Tuner/IF block diagram (E model)



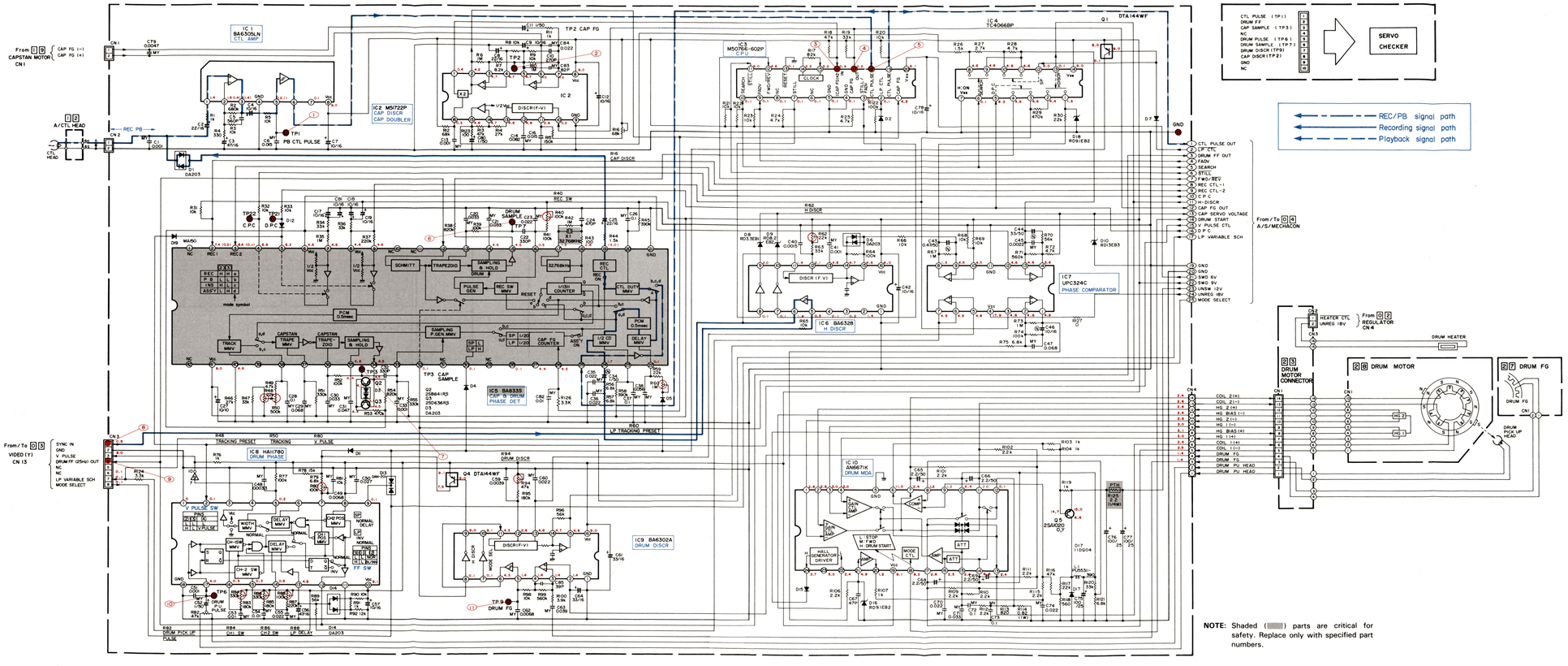
4.12.2 Tuner/IF block diagram (EB/EG models)





NOTES: 1. Voltages are DC-measured with a digital voltmeter during stop mode.
2. Shaded (▒▒) parts are critical for safety. Replace only with specified part numbers.

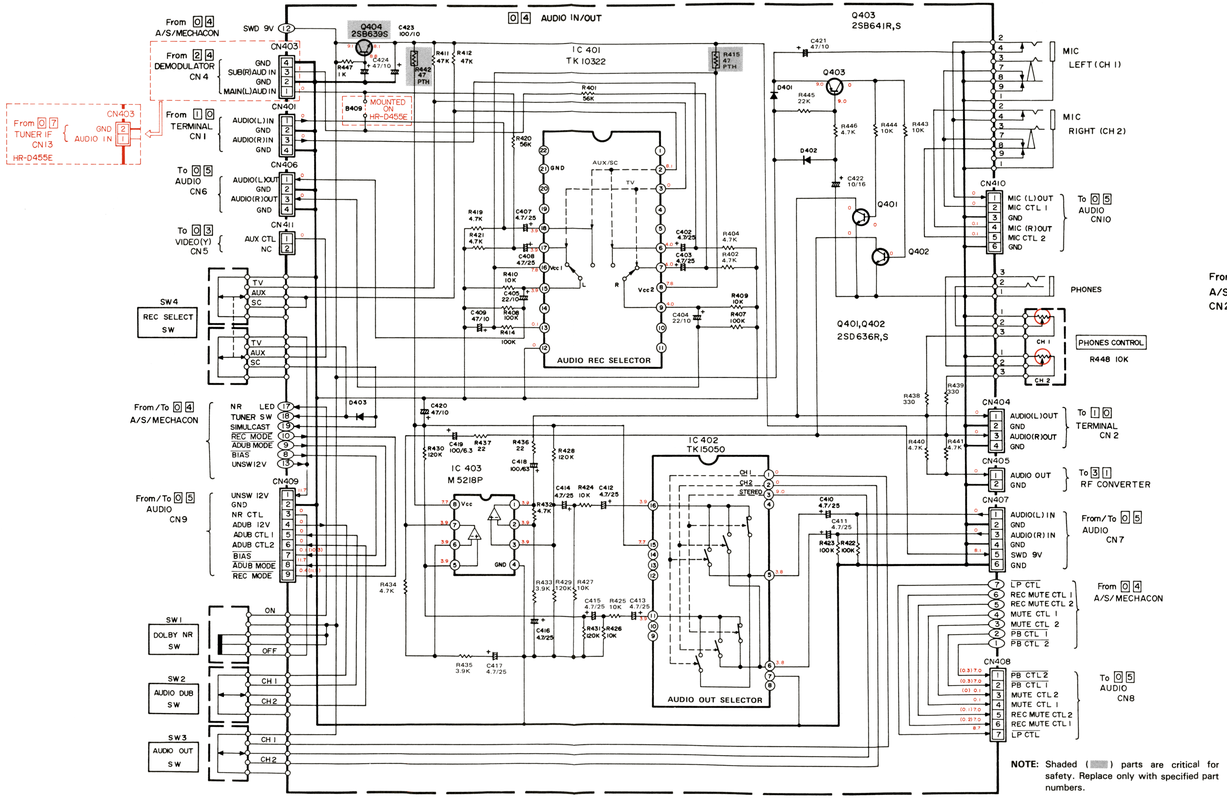
4.14 A/SERVO/M SCHEMATIC DIAGRAM



Waveforms of Servo circuit

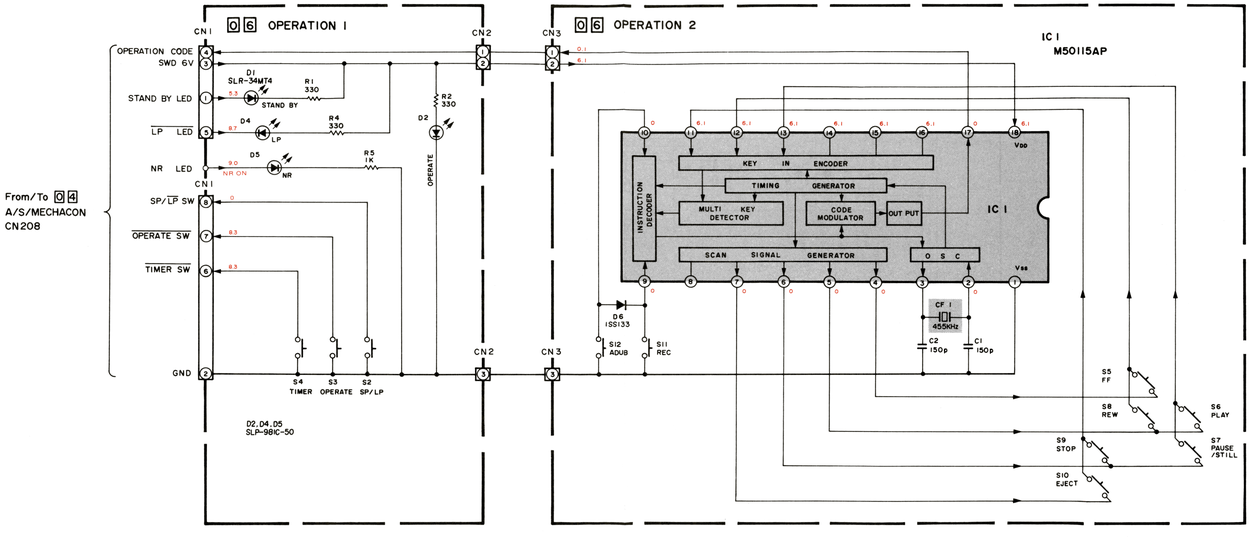
1 PB TP1 (CTL PULSE) 0.7 Vp-p, 25 Hz	2 PB TP2 (CAP FG) 2.8 Vp-p, 500 Hz
3 PB IC3-16 (CAP FG) 5.0 Vp-p	4 PB IC3-17 (CAP FG) 8.0 Vp-p
5 PB IC3-18 (CTL PULSE) 8.0 Vp-p	6 PB TP7 (DRUM SAMPLE) 9.0 Vp-p, 4.5 V DC 25 Hz
7 PB TP3 (CAP SAMPLE) 9.0 Vp-p, 4.5 V DC 25 Hz	8 CN3-1 (SYNC) 2.6 Vp-p
9 CN3-4 (DRUM FF) 9.0 Vp-p, 25 Hz	10 TP6 (DRUM PU PULSE) 1.5 Vp-p, 25 Hz
11 TP9 (DRUM FG) 1.5 Vp-p, 1500 Hz	

4.15 AUDIO(IN/OUT)/S/M SCHEMATIC DIAGRAM



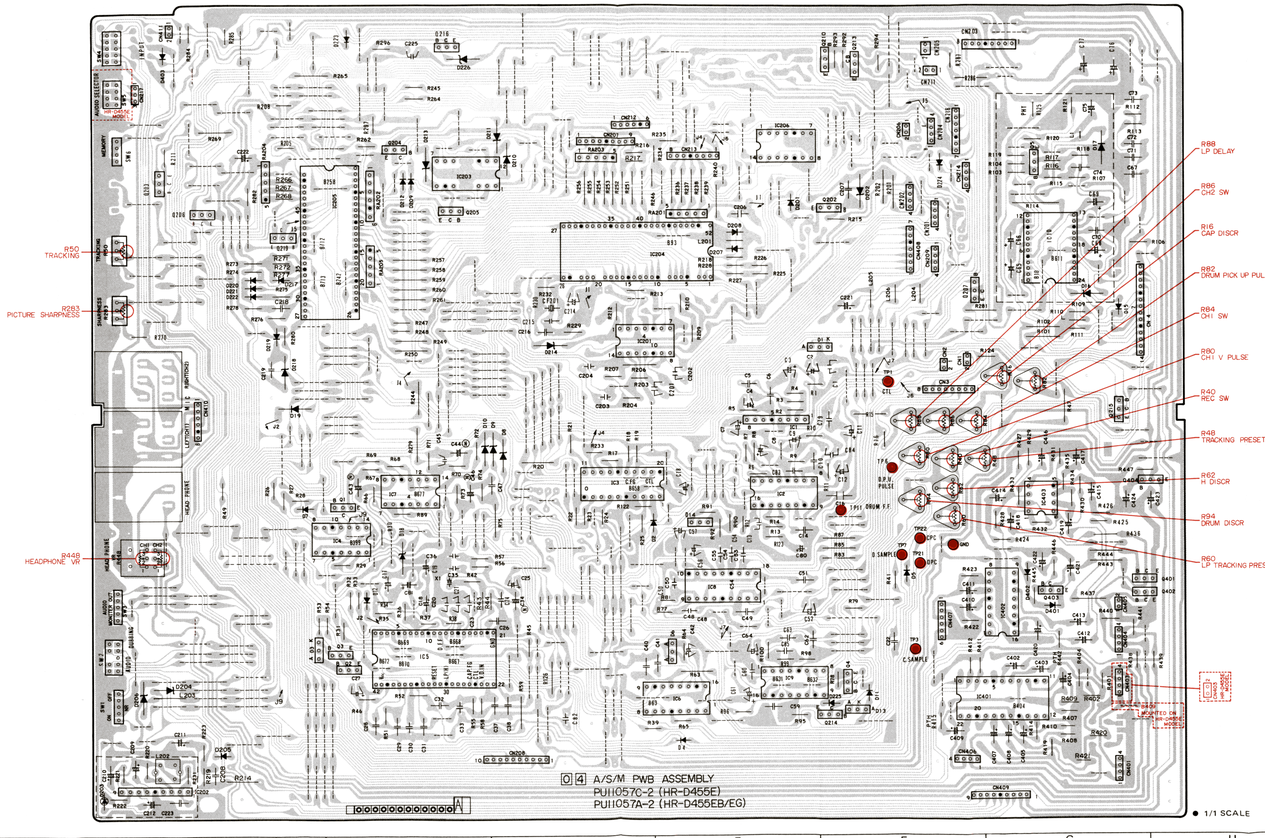
NOTE: Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

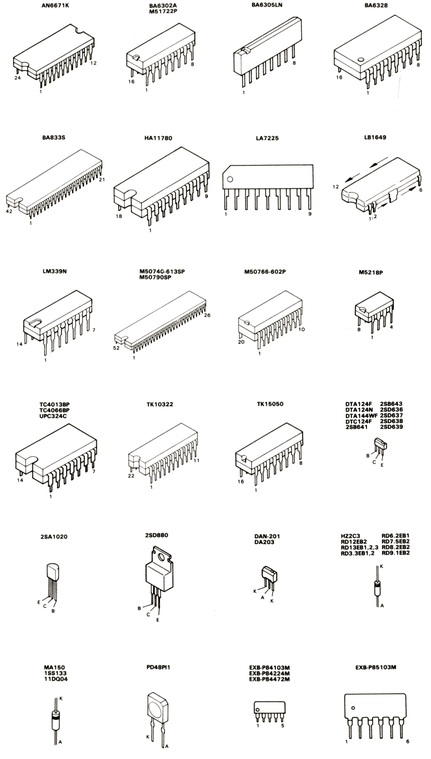
4.16 OPERATION SCHEMATIC DIAGRAMS



NOTES: 1. Voltages are DC-measured with a digital voltmeter during stop mode.
2. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.17 AUDIO(IN/OUT)/SERVO/MECHACON CIRCUIT BOARD

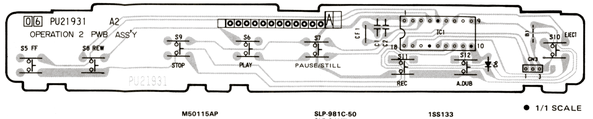


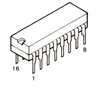


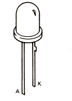
OPERATION OPERATION

4.18 OPERATION CIRCUIT BOARDS AND MODE SHIFT TABLE

– OPERATION 2 –

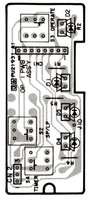



M50115AP


SLP-981C-50 SLR-34MT4

1SS133

– OPERATION 1 –

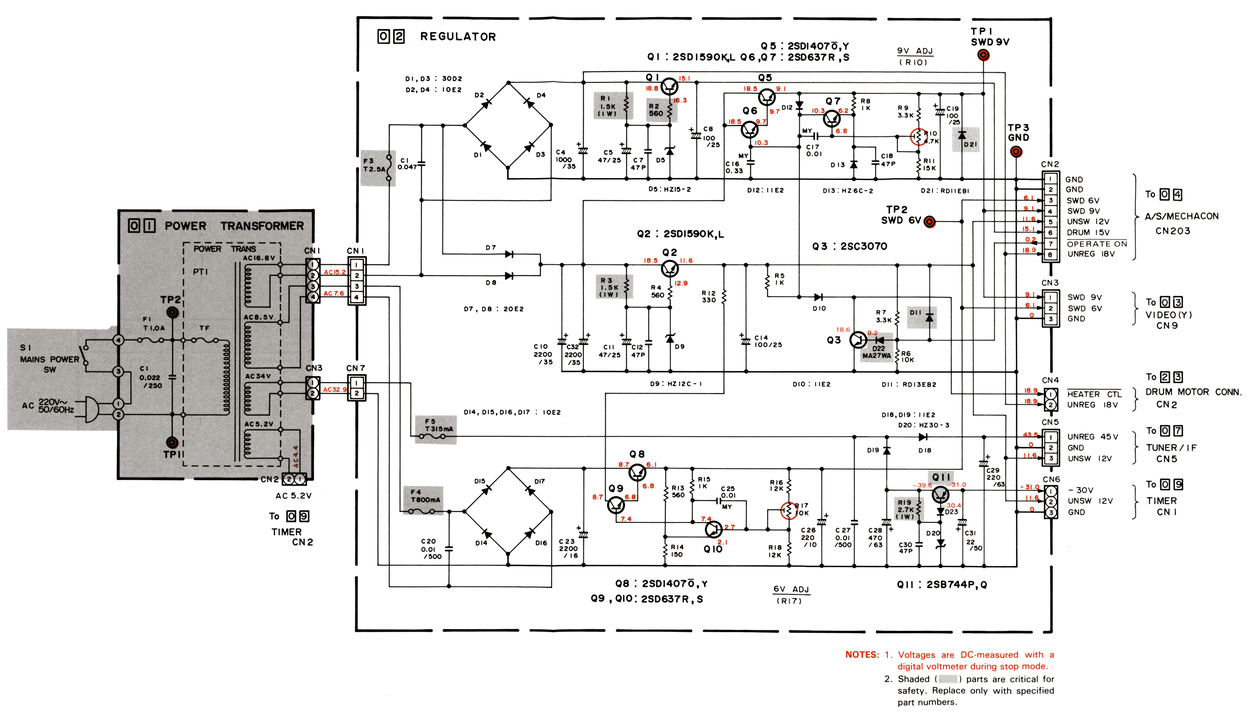

1/1 SCALE

– MODE SHIFT TABLE –

MODE / KEY	STOP	PLAY	STILL	FF	REW	REC	REC + PAUSE	A. DUB + PLAY	A. DUB + PAUSE	INSTANT REC	TIMER REC
STOP		○	○	○	○	○	○	○	○	○	×
PLAY	○		○	○	○		○ (REC PLAY)		○ (A. DUB PLAY)	×	×
PAUSE + STILL	×	○	○ (FADV)	×	×	○ (REC PAUSE)		○ (A. DUB PAUSE)	○ (FADV)	×	×
FF	○	○ (S. FF)	○ (S. FF)		○	×	×	×	×	×	×
REW	○	○ (S. REW)	○ (S. REW)	○		×	×	×	×	×	×
REC + PLAY	○	○	○	○	○		○	○	○	×	×
REC + PAUSE	○	○	○	○	○	○		○	○	×	×
A. DUB + PLAY	○	○	○	○	○	×	×		○	×	×
A. DUB + PAUSE	○	○	○	○	○	×	×	○		×	×
EJECT	○	○	○	○	○	×	×	×	×	×	×
INSTANT REC	○	○	○	○	○	○	○	○	○	○ (※1)	×
CH. UP / DOWN	○	×	×	○	○	×	○	×	×	×	×

Notes: ○ : Enabled (mode changes)
× : Inhibited (mode does not change)
※1 : Rec time advance

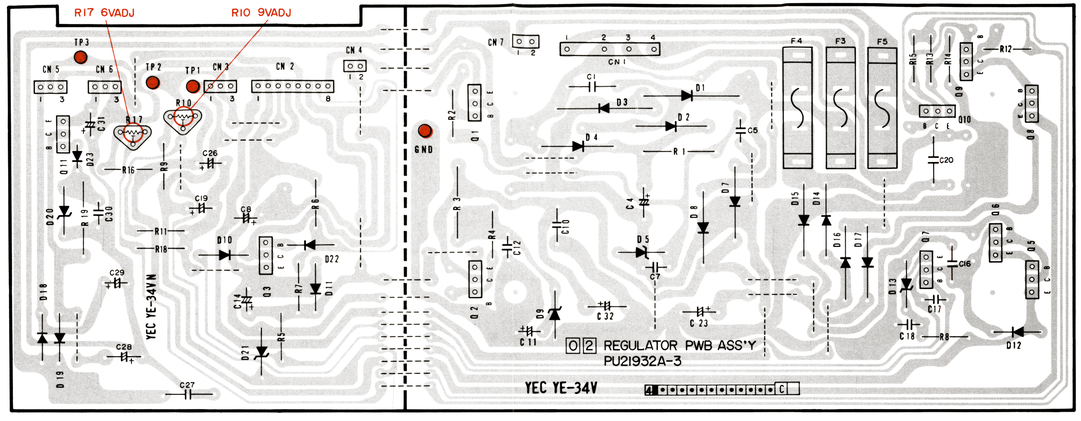
4.19 POWER TRANSFORMER AND REGULATOR SCHEMATIC DIAGRAMS



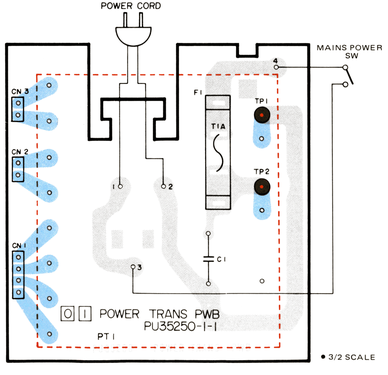
NOTES: 1. Voltages are DC-measured with a digital voltmeter during stop mode.
2. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

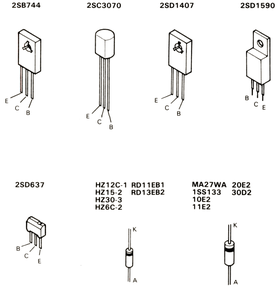
4.20 POWER TRANSFORMER AND REGULATOR CIRCUIT BOARDS

– REGULATOR –



– POWER TRANSFORMER –

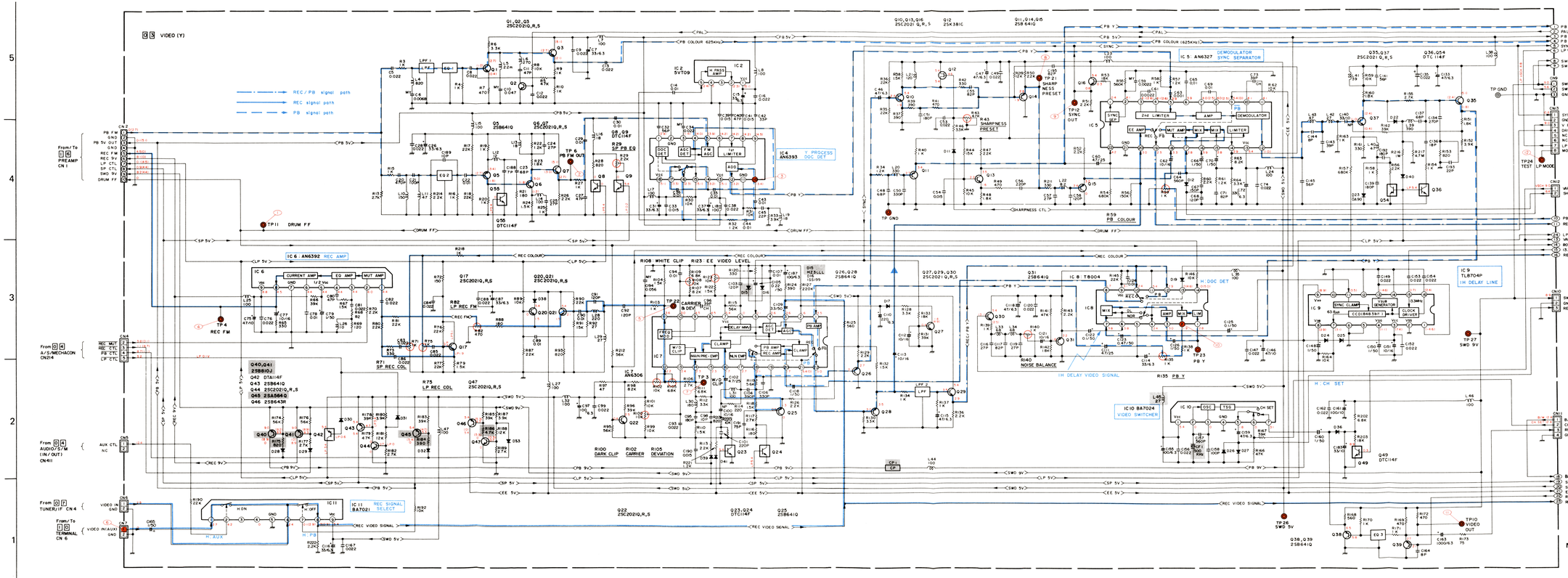




VIDEO VIDEO

4.21 VIDEO SCHEMATIC DIAGRAMS

4.21.1 Luminance



Waveforms of Video circuit

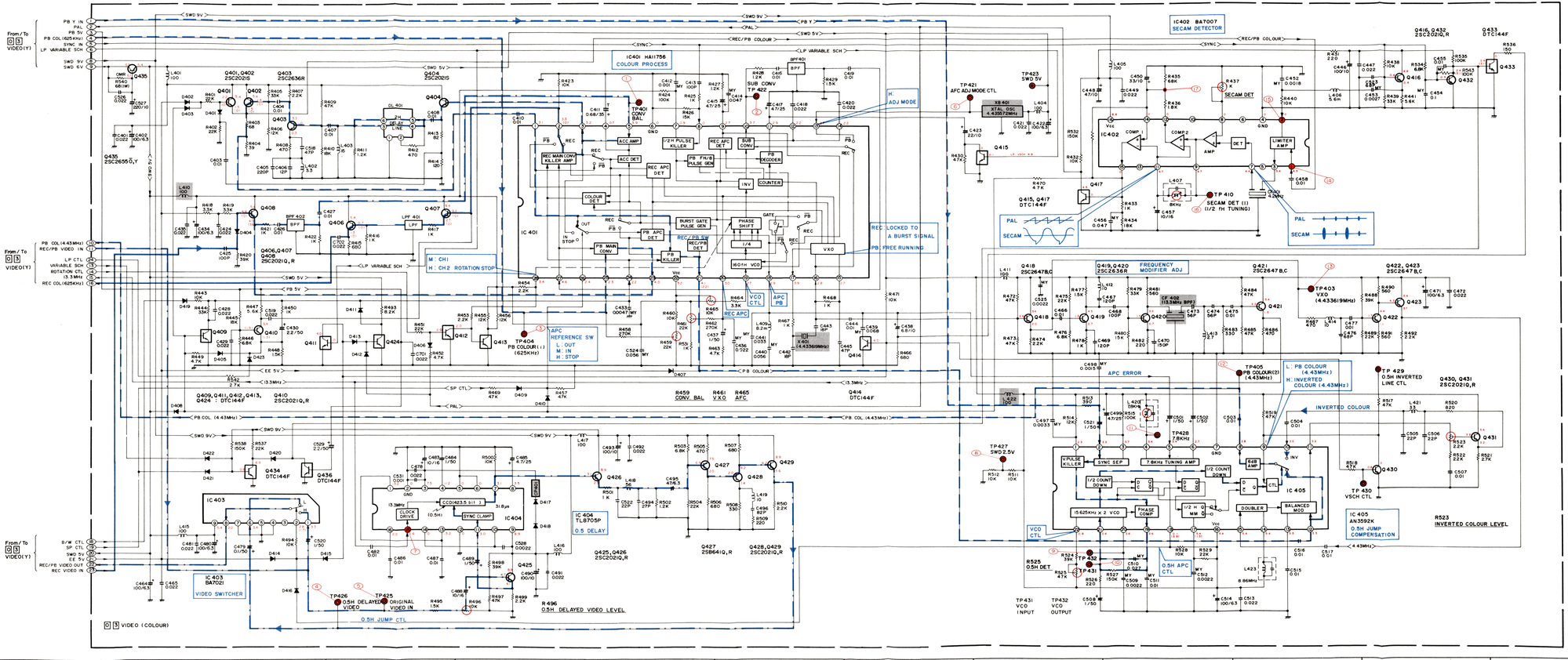
— Luminance —

1 — TP11 (FLIP FLOP) 9.0 Vp-p	2 PB — TP6 (PB FM OUT) 1.0 Vp-p
3 PB (SP) — IC4-10 0.8 Vp-p	4 REC (SP) — TP4 (SP REC FM OUT) 3.5 Vp-p
4 REC (LP) — TP4 (LP REC FM OUT) 2.4 Vp-p	5 REC — TP22 (CARRIER/DEV) 0.8 Vp-p
6 REC — CN7-1 (VIDEO IN) 1.0 Vp-p	7 REC — TP3 (W/D CLIP) 0.6 Vp-p
8 PB — TP21 (SHARPNESS PRESET) 1.1 Vp-p	9 — TP12 (SYNC) 2.9Vp-p
10 PB — IC8-2 (PB Y) 0.7Vp-p	11 — TP10 (VIDEO OUT) 2.0 Vp-p

12 TP24: For adjusting video circuit, connect a jump wire between TP24 and TP27. Then only VIDEO and SERVO (Drum circuit) operate as LP mode.

NOTE: Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.21.2 Colour



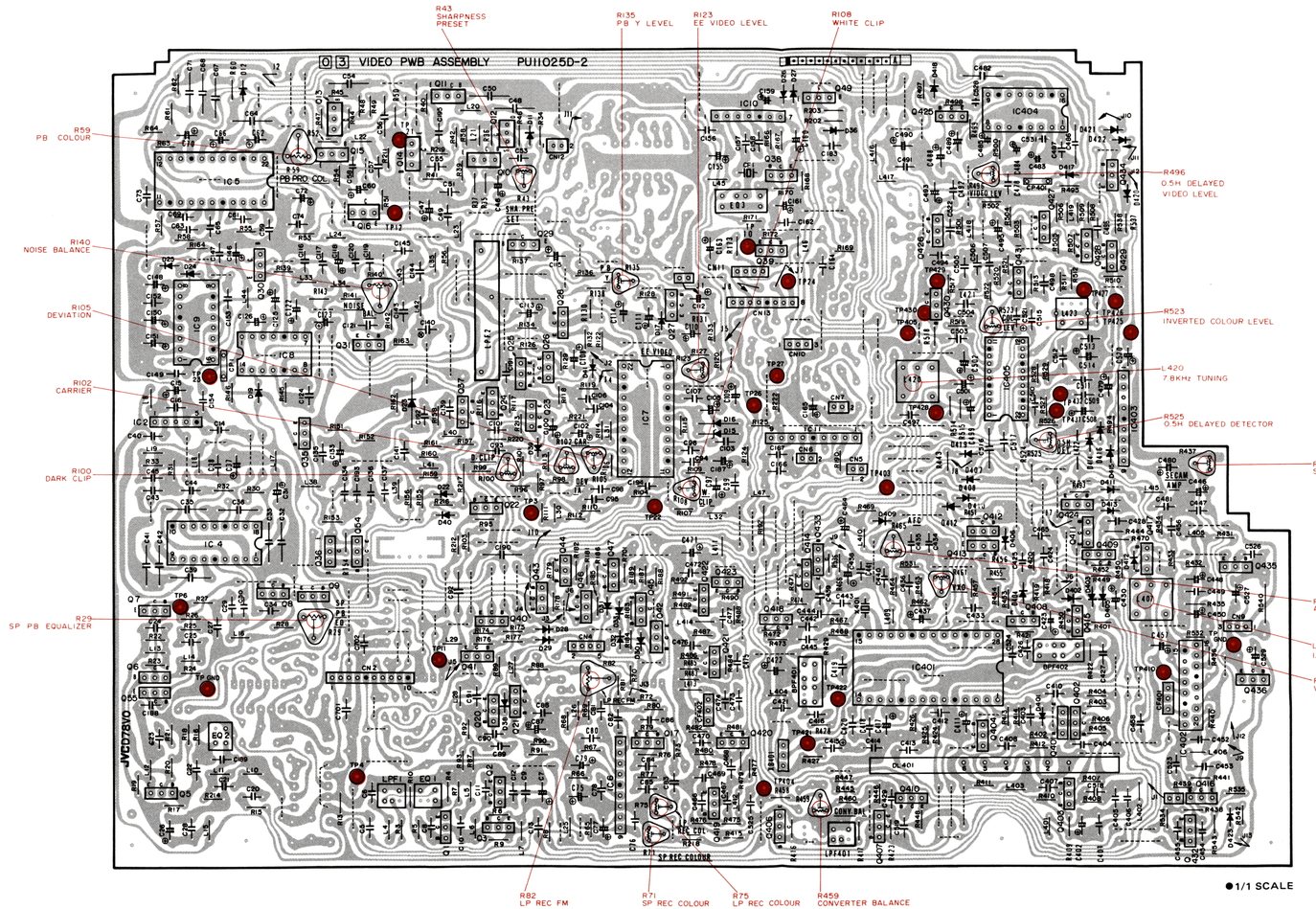
Waveforms of Video circuit

— Colour —

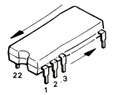
1 REC TP401 (CONV BAL) 0.16 Vp-p	1 PB TP401 (CONV BAL) 0.26 Vp-p	2 TP432 (SUB CONV.) 0.8 Vp-p (REC) 0.6 Vp-p (PB)
3 PB TP404 (PB COLOUR 1) 0.3 Vp-p	4 TP426 (0.5 H DELAYED VIDEO) 2.0 Vp-p	5 TP425 (ORIGINAL VIDEO) 2.0 Vp-p
6 TP421 0.3 Vp-p 4.435572 MHz	7 PB IC404-15 13.3 MHz 0.4 Vp-p	8 TP427 2.5 V DC
9 TP432 (VCO OUT) 2.5 Vp-p	10 TP431 (VCO IN) 15.625 kHz 0.3 Vp-p	11 PB TP428 7.8 kHz 1 Vp-p
12 PB TP405 (PB COLOUR) 0.6 Vp-p 4.43 MHz	13 TP403 (VXO) 0.4 Vp-p 4.43 MHz	14 IC402-1 PAL only 0.5 Vp-p
14 IC402-1 SECAM only 0.58 Vp-p (REC) 0.4 Vp-p (PB)	15 IC402-2 V. SYNC 1.2 Vp-p	16 TP410 (SECAM DET 1) SECAM only 6 Vp-p, 7.8 kHz
17 TP424 (SECAM DET 2) SECAM only 4.5 V DC		

NOTE: Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

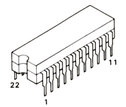
4.22 VIDEO CIRCUIT BOARD



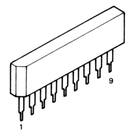
AN3592K



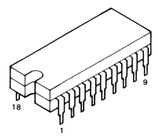
AN6306
AN6327



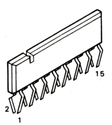
AN6392



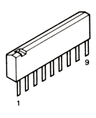
AN6393



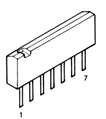
BA7007



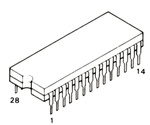
BA7021



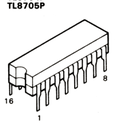
BA7024



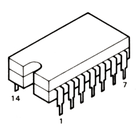
HA11756



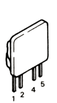
TL8704P
TL8705P



T8004

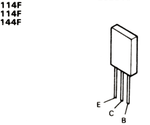


5VT09

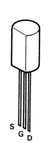


2SA564 2SC2647
2SB641 DTA114F
2SB643 DTC114F
2SC2021 DTC144F
2SC2636

2SB810



2SK381



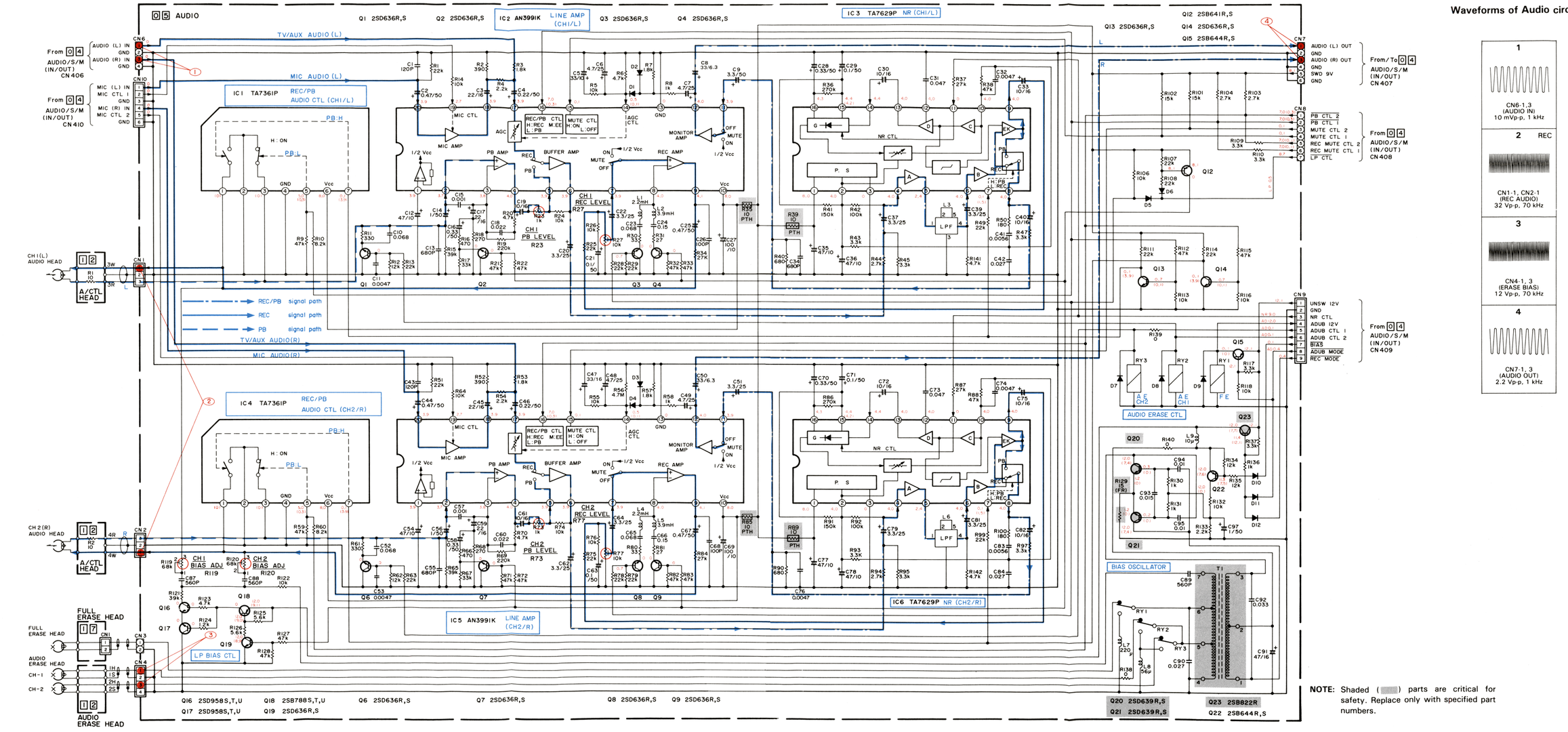
2SC2655

0A90
1SS133
1SS99

HZ3CLL

4.23 AUDIO SCHEMATIC DIAGRAM

AUDIO AUDIO



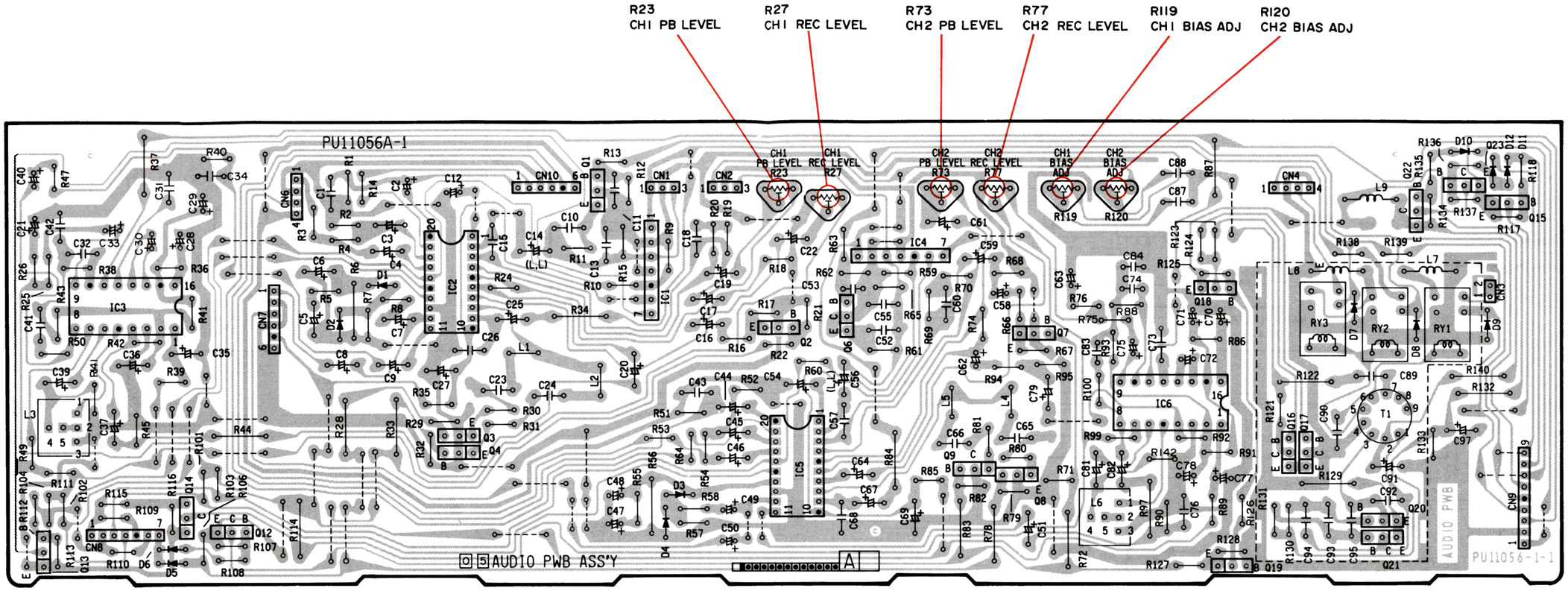
Waveforms of Audio circuit

1
CN6-1, 3 (AUDIO IN) 10 mVp-p, 1 kHz
2 REC
CN1-1, CN2-1 (REC AUDIO) 32 Vp-p, 70 kHz
3
CN4-1, 3 (ERASE BIAS) 12 Vp-p, 70 kHz
4
CN7-1, 3 (AUDIO OUT) 2.2 Vp-p, 1 kHz

NOTE: Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

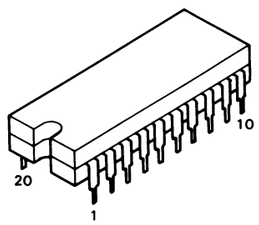
4-22

4.24 AUDIO CIRCUIT BOARD

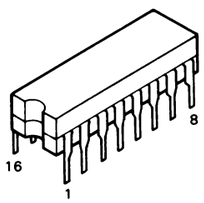


● 6/5 SCALE

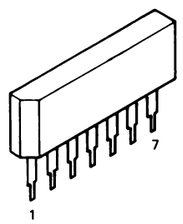
AN3991K



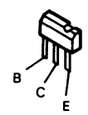
TA7629P



TA7361P

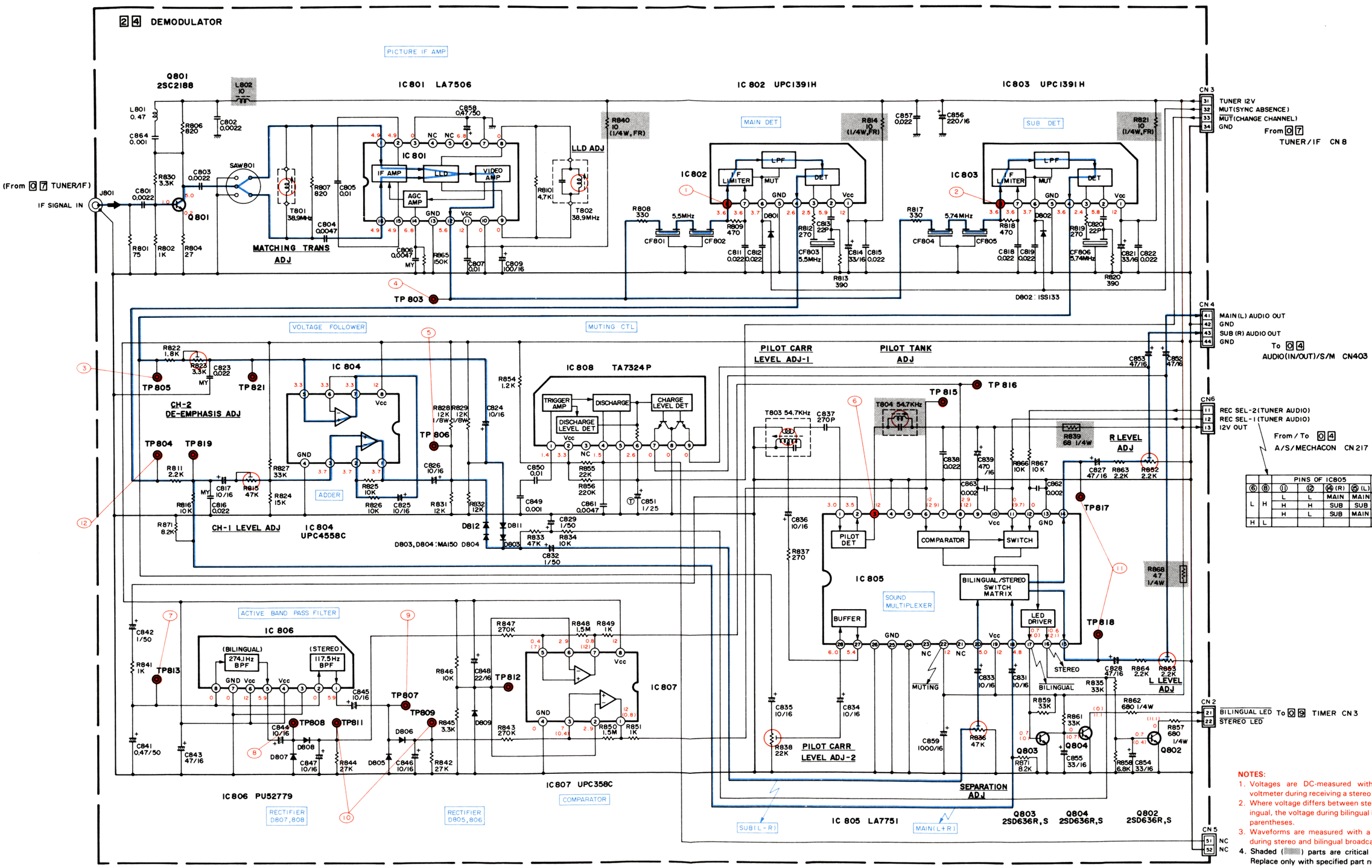


2SB641 2SD636
2SB644 2SD639
2SB788 2SD958
2SB822



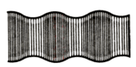
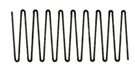
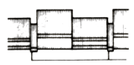
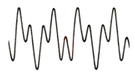
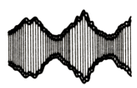
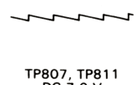
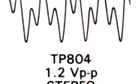
1SS133

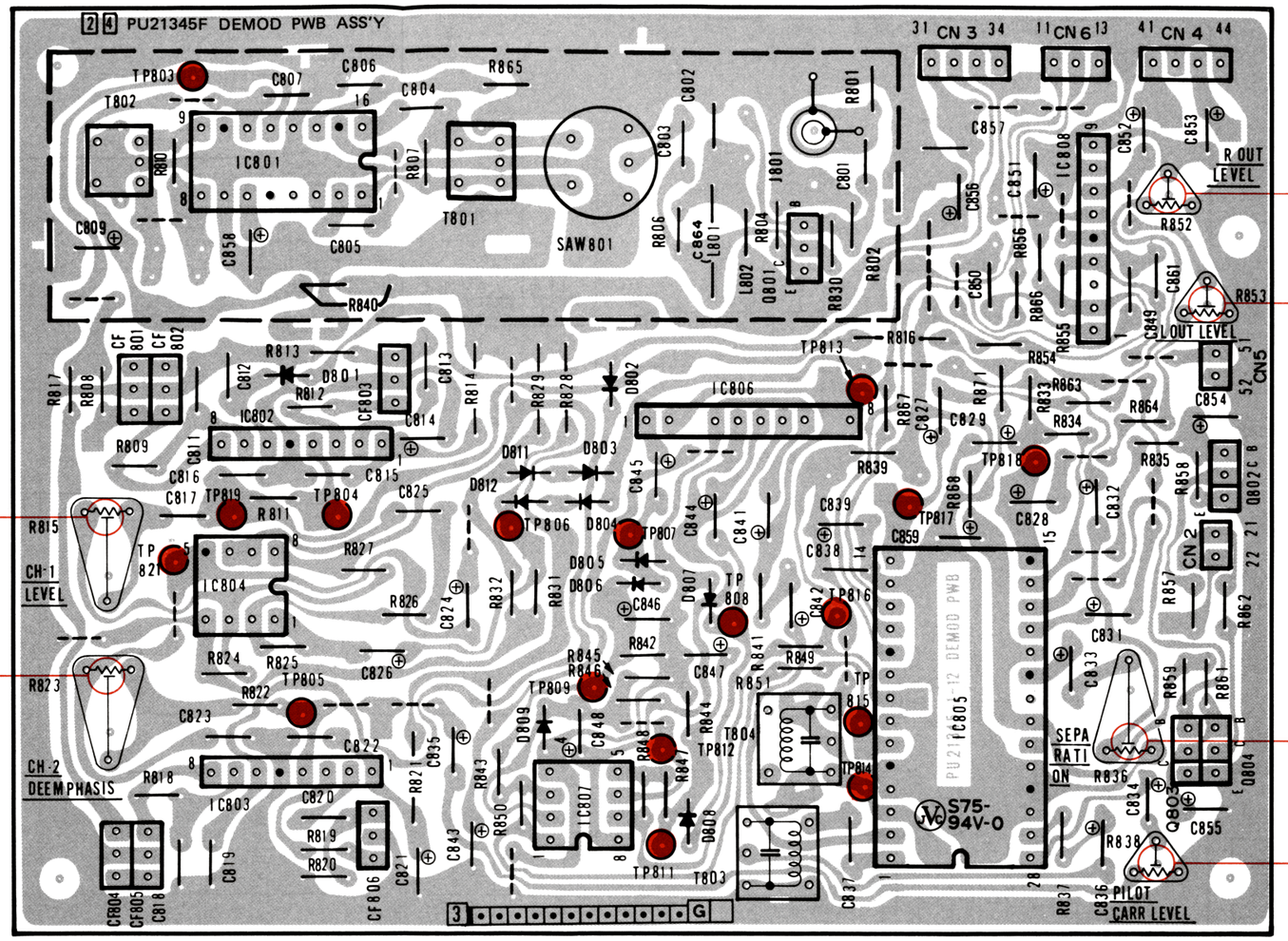
4.25 DEMODULATOR SCHEMATIC DIAGRAM



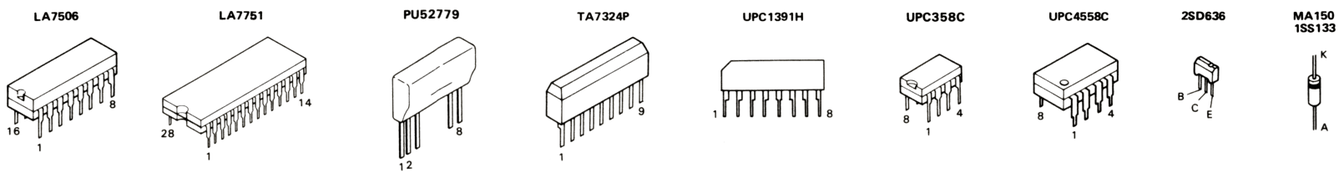
4.26 DEMODULATOR CIRCUIT BOARD

Waveforms of Demodulator circuit

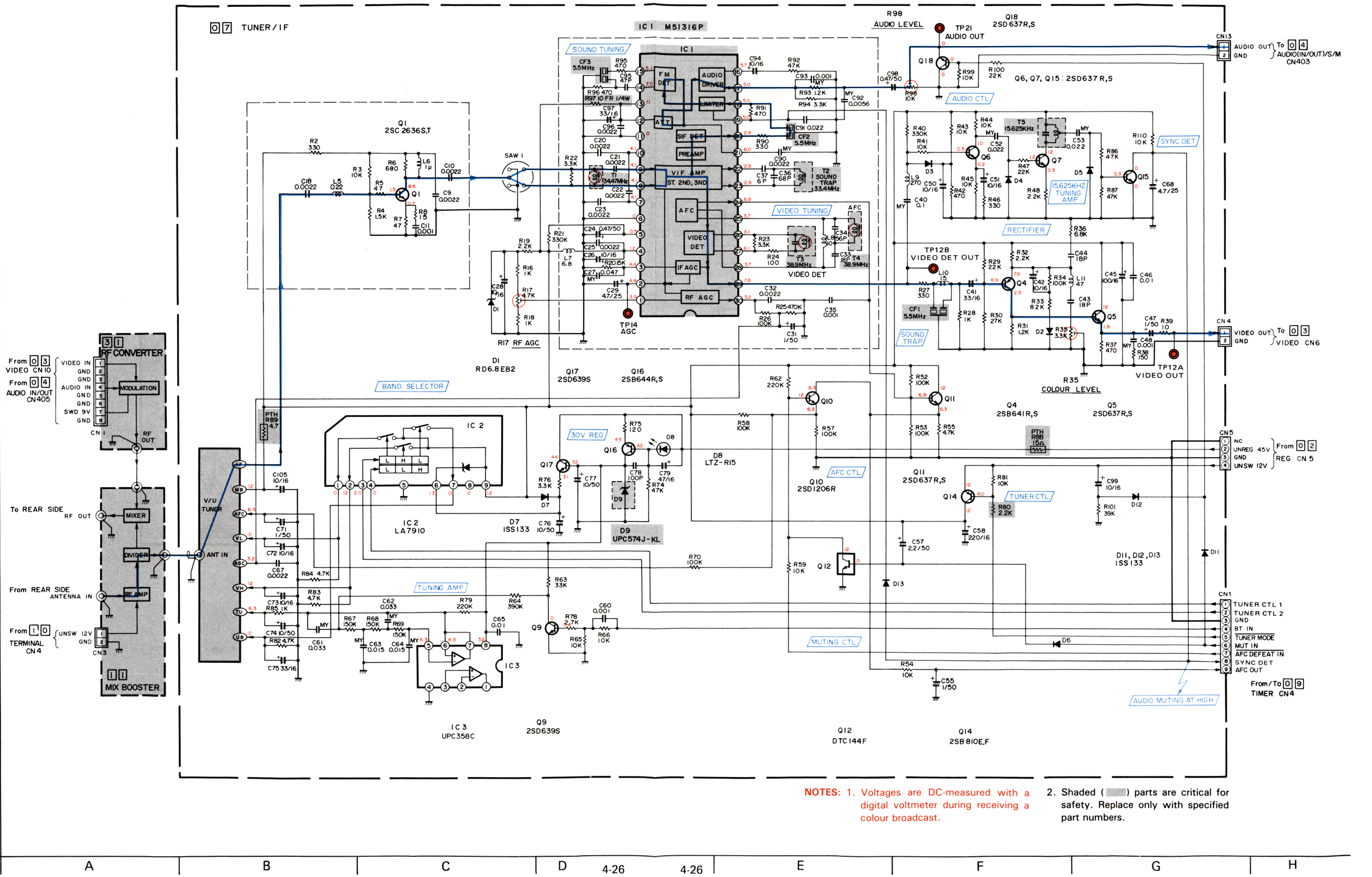
1 IC802-8 0.24 Vp-p	2  IC803-8 0.08 Vp-p
3  TP805 1.4 Vp-p	4  TP803 3.0 Vp-p
5 TP806 0.9 Vp-p STEREO	5  TP806 1.6 Vp-p BILINGUAL
6  IC805-3 3.8 Vp-p	7 TP813 1.0 Vp-p
8 TP808 8.0 Vp-p	9 TP807 8.0 Vp-p
10  TP807, TP811 DC 7.0 V	11 TP817, TP818 1.6 Vp-p
12 TP804 1.2 Vp-p BILINGUAL	12  TP804 1.2 Vp-p STEREO



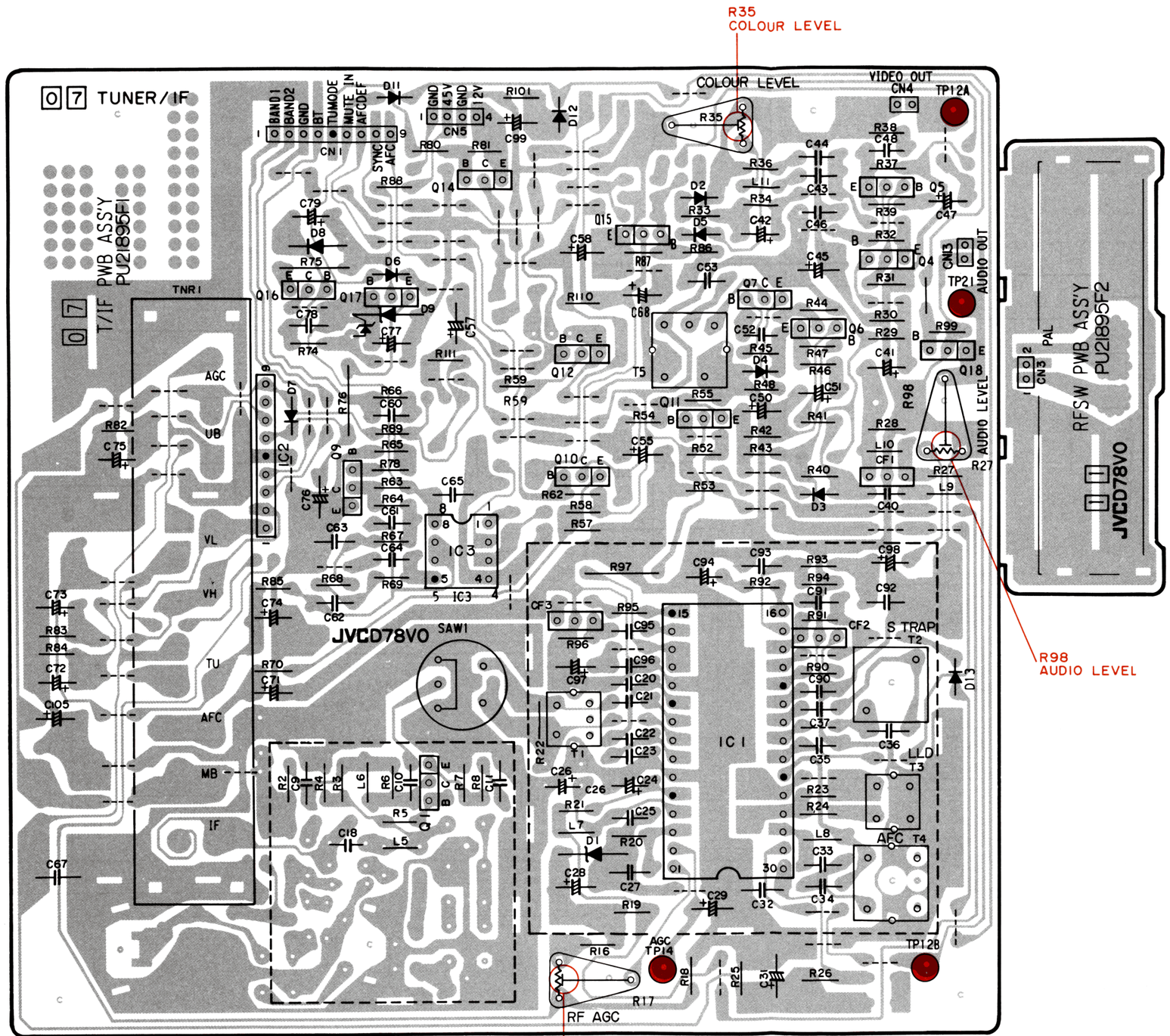
LA7506 LA7751 PU52779 TA7324P UPC1391H UPC358C UPC4558C 2SD636 MA150 1SS133



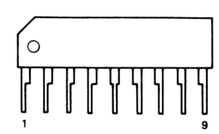
4.27 TUNER/IF SCHEMATIC DIAGRAM (E model)



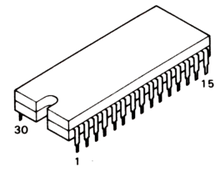
4.28 TUNER/IF CIRCUIT BOARD (E model)



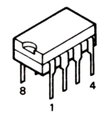
LA7910



M51316P



UPC358C



DTC144F 2SC2636
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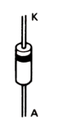
2SB644 2SD637
2SB810 2SD639

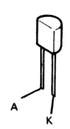
LTZ-R15

RD6.8EB2

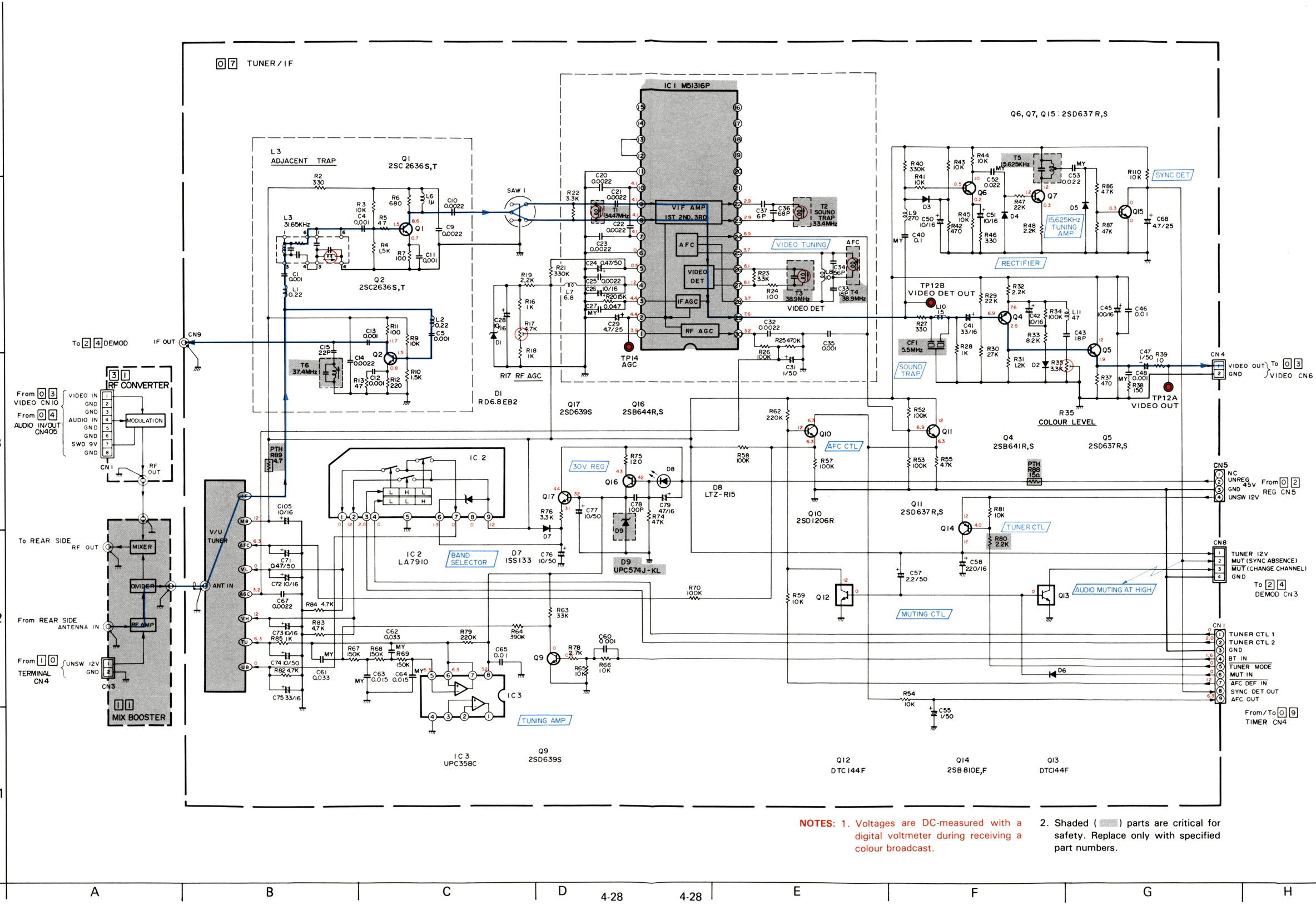
1SS133



UPC574J-KL



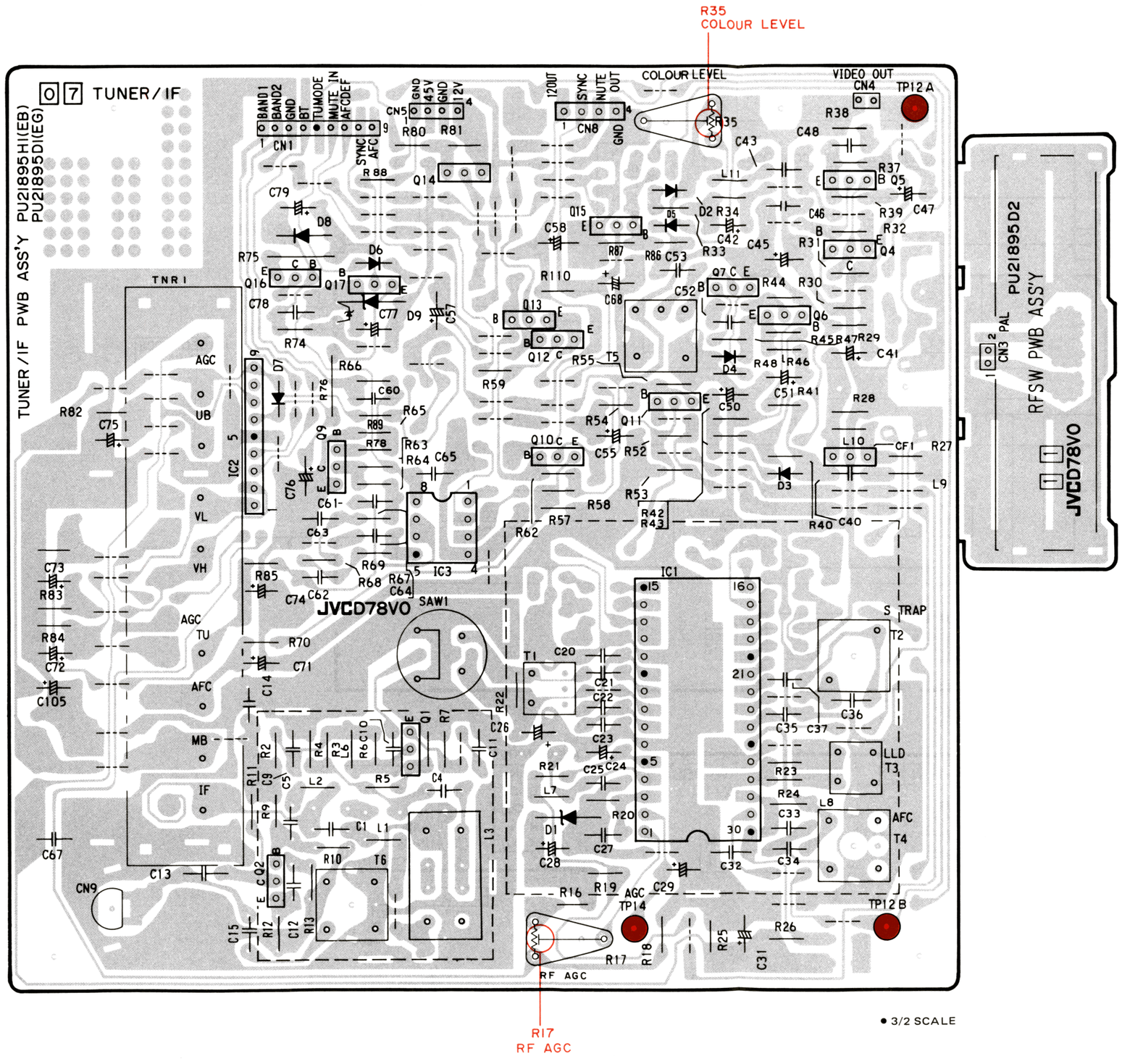
4.29 TUNER/IF SCHEMATIC DIAGRAM (EB/EG models)



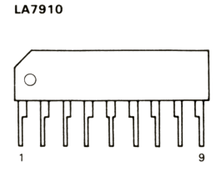
NOTES: 1. Voltages are DC-measured with a digital voltmeter during receiving a colour broadcast.

2. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

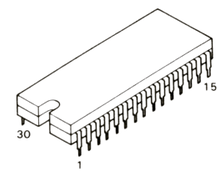
4.30 TUNER/IF CIRCUIT BOARD (EB/EG models)



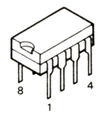
LA7910



M51316P



UPC358C



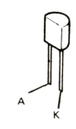
DTC144F 2SC2636
2SB641 2SD1206
2SB644 2SD637
2SB810 2SD639

LTZ-R15

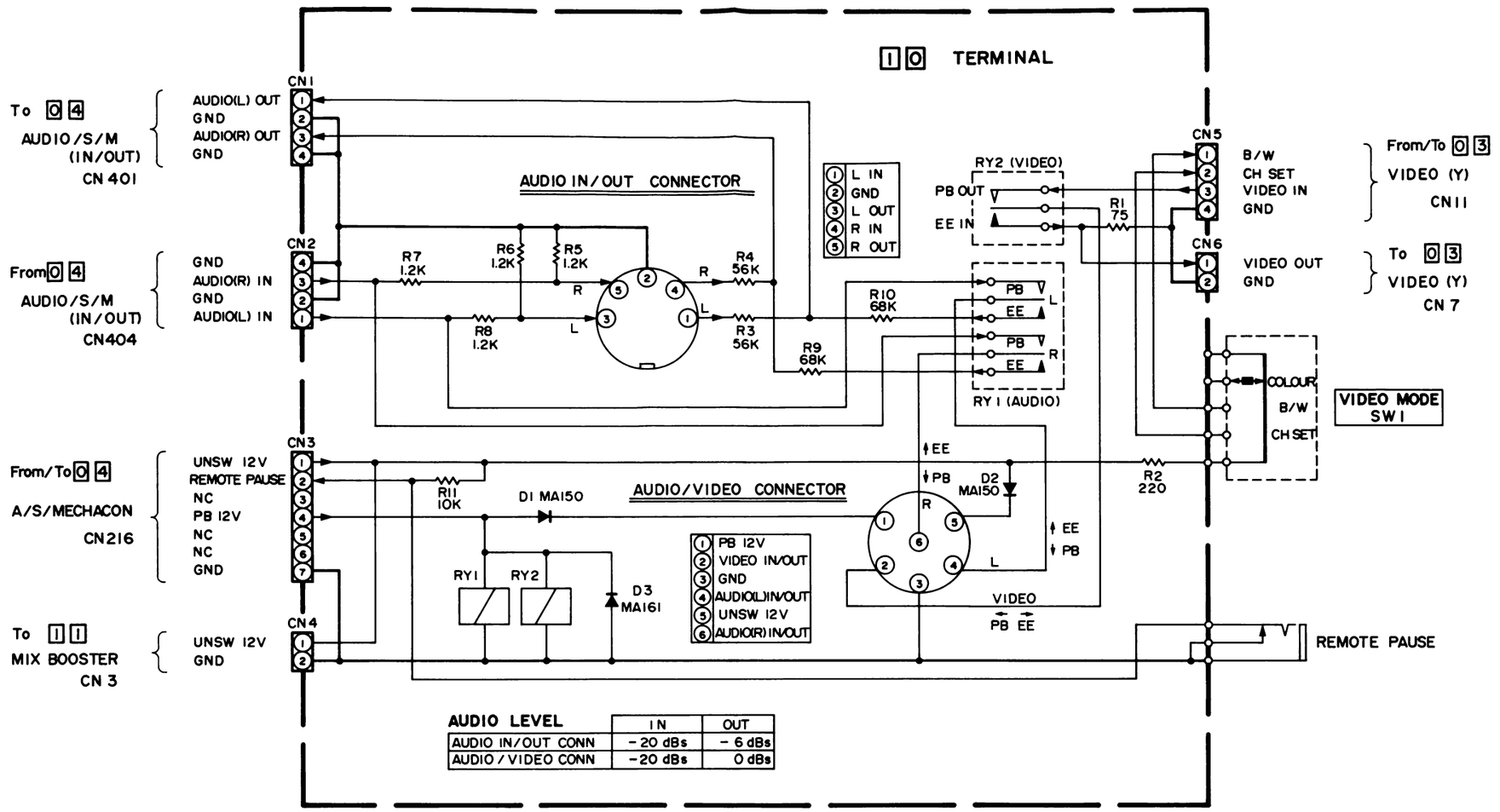
RD6.8EB2

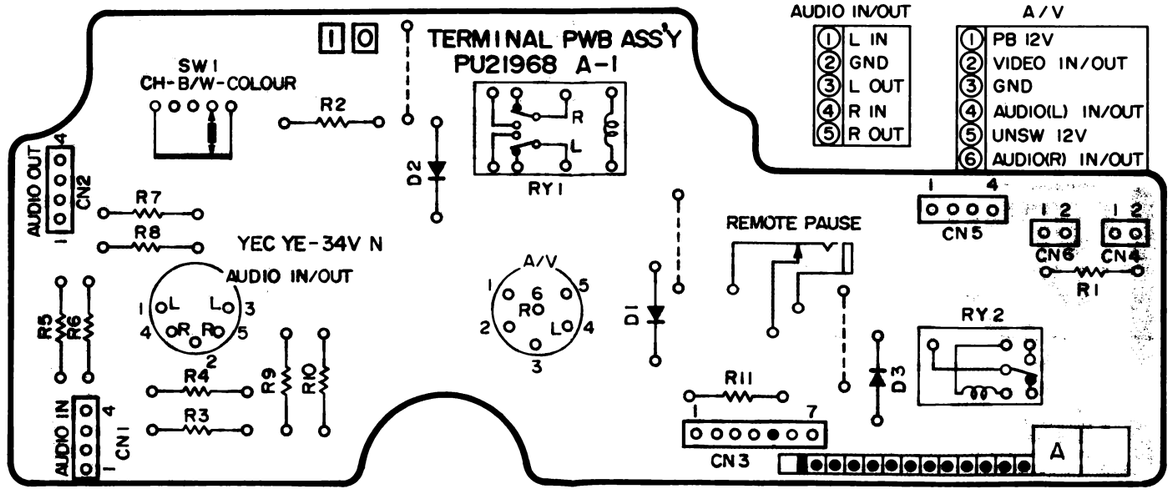
1SS133

UPC574J-KL

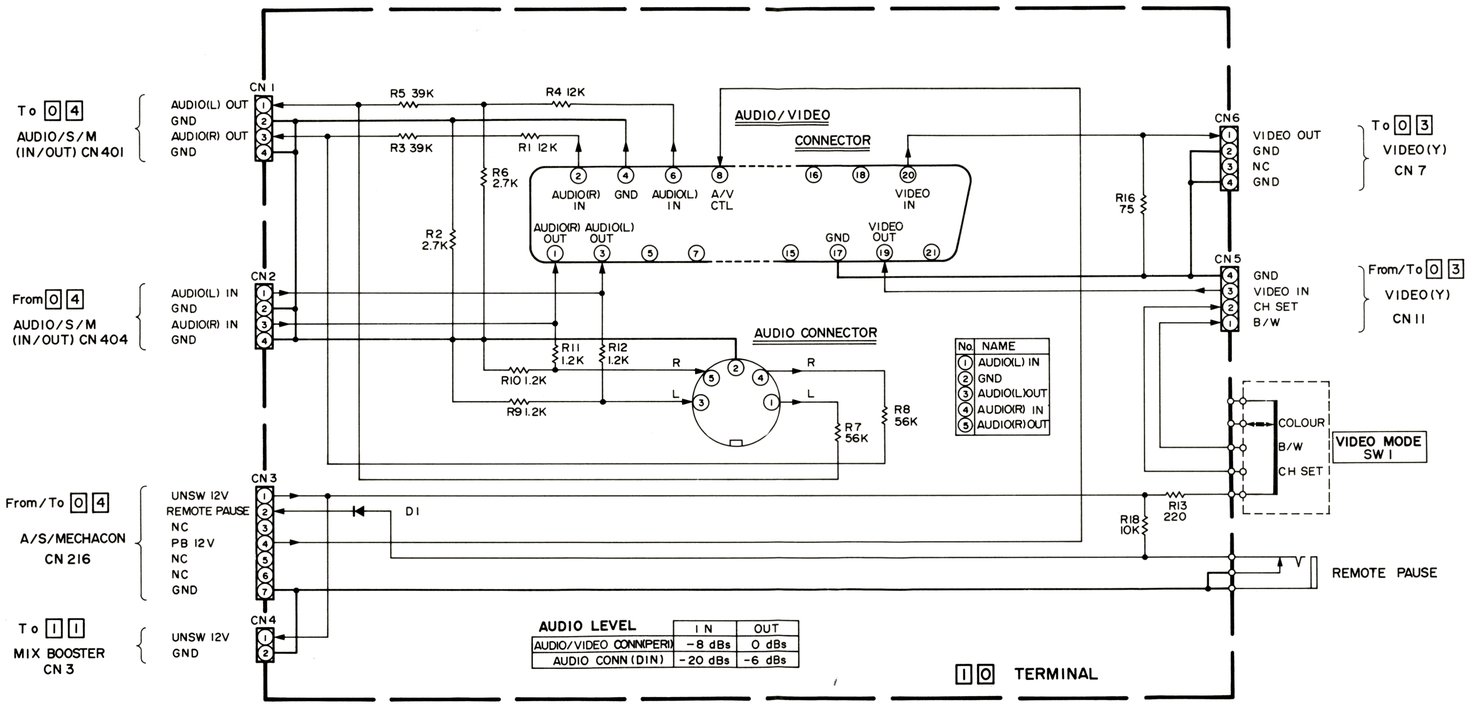


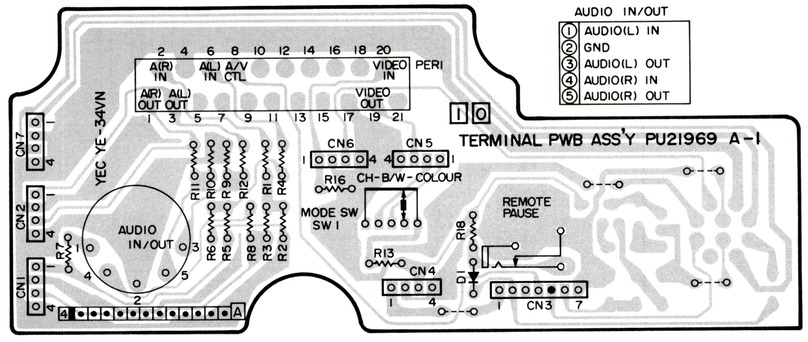
4.31 TERMINAL SCHEMATIC DIAGRAM AND CIRCUIT BOARD (E model)





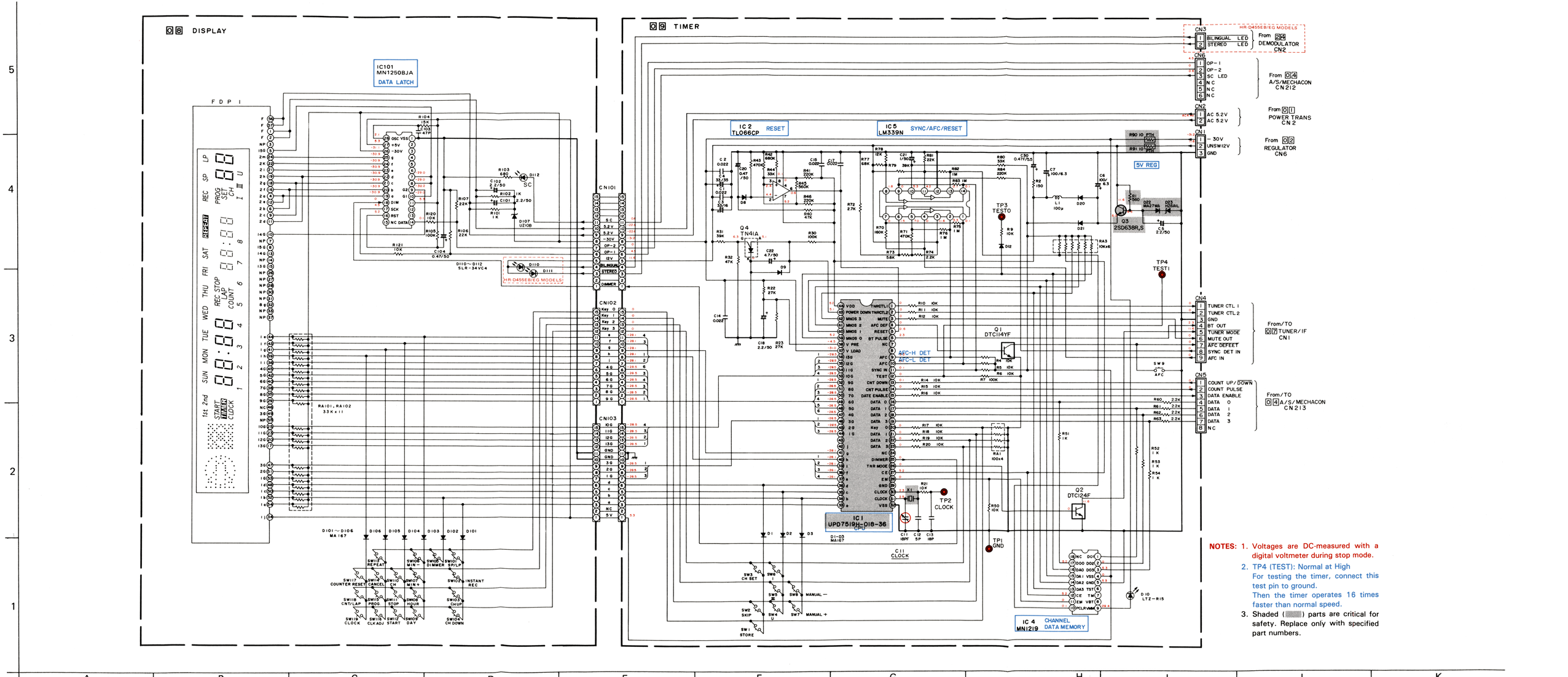
4.32 TERMINAL SCHEMATIC DIAGRAM AND CIRCUIT BOARD (EB/EG models)





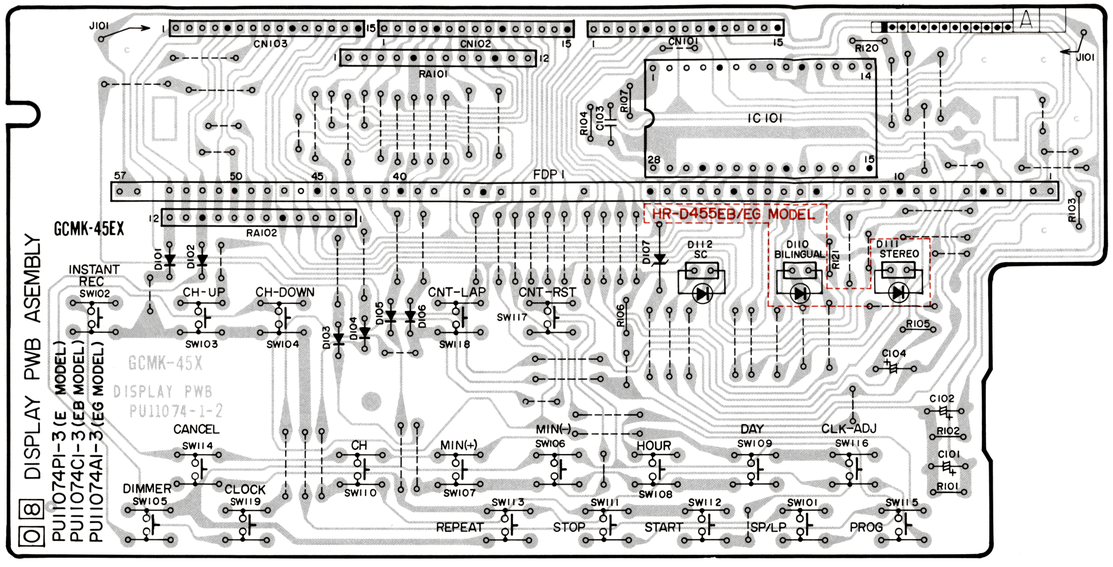
• 3/2 SCALE

4.33 DISPLAY AND TIMER SCHEMATIC DIAGRAMS

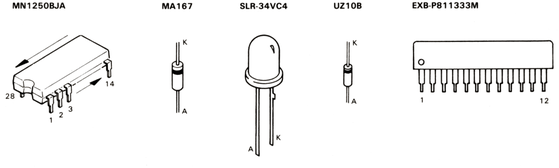

08 DISPLAY
09 TIMER
IC101 MN1250BJA DATA LATCH
FDP1
IC2 TL066CP RESET
IC5 LM339N SYNC/AFC/RESET
5V REG
IC1 UPD7519H-018-36 CPU
IC4 MN1219 CHANNEL DATA MEMORY
Q1 DTC114YF
Q2 DTC124F
Q3 2SD638R,S
Q4 TN4IA
TP1 GND
TP2 CLOCK
TP3 TESTO
TP4 TESTI
CN1 30V UNSW12V GND From 02 REGULATOR CN6
CN2 AC 5.2V AC 5.2V From 01 POWER TRANS CN2
CN3 HR-D455EB/EG MODELS BILINGUAL LED STEREO LED From 04 DEMODULATOR CN2
CN6 OP-1 OP-2 SC LED N.C N.C N.C From 04 A/S/MECHACON CN212
CN4 TUNER CTL 1 TUNER CTL 2 GND BT OUT TUNER MODE MUTE OUT AFC DEFEET SYNC DET IN AFC IN From/TO 07 TUNER/IF CN1
CN5 COUNT UP/DOWN COUNT PULSE DATA ENABLE DATA 0 DATA 1 DATA 2 DATA 3 N.C From/TO 04 A/S/MECHACON CN213
CN101 CN102 CN103
SW1 STORE
SW2 SKIP
SW3 CH SET
SW4 SW5 SW6 SW7 SW8 MANUAL
SW9 AFC
SW101 REPEAT
SW102 INSTANT REC
SW103 COUNTER RESET
SW104 CANCEL
SW105 CH
SW106 MIN+
SW107 MIN-
SW108 CNT/LAP
SW109 PROG
SW110 STOP
SW111 HOUR
SW112 CLOCK
SW113 CLKADJ
SW114 START
SW115 DAY
SW116 CH DOWN
SW117 CHUP
SW118 DIMMER
SW119 SP/LP
D101~D106 MA167
D107 UZ10B
D110~D112 SLR-34VC4
D110 D111 D112 SC
D1-D3 MA167
D10 LTZ-R15
RA101, RA102 33K x 11
RA1 100x4
X1
C11 CLOCK
NOTES: 1. Voltages are DC-measured with a digital voltmeter during stop mode.
2. TP4 (TEST): Normal at High
For testing the timer, connect this test pin to ground.
Then the timer operates 16 times faster than normal speed.
3. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.34 DISPLAY AND TIMER CIRCUIT BOARDS

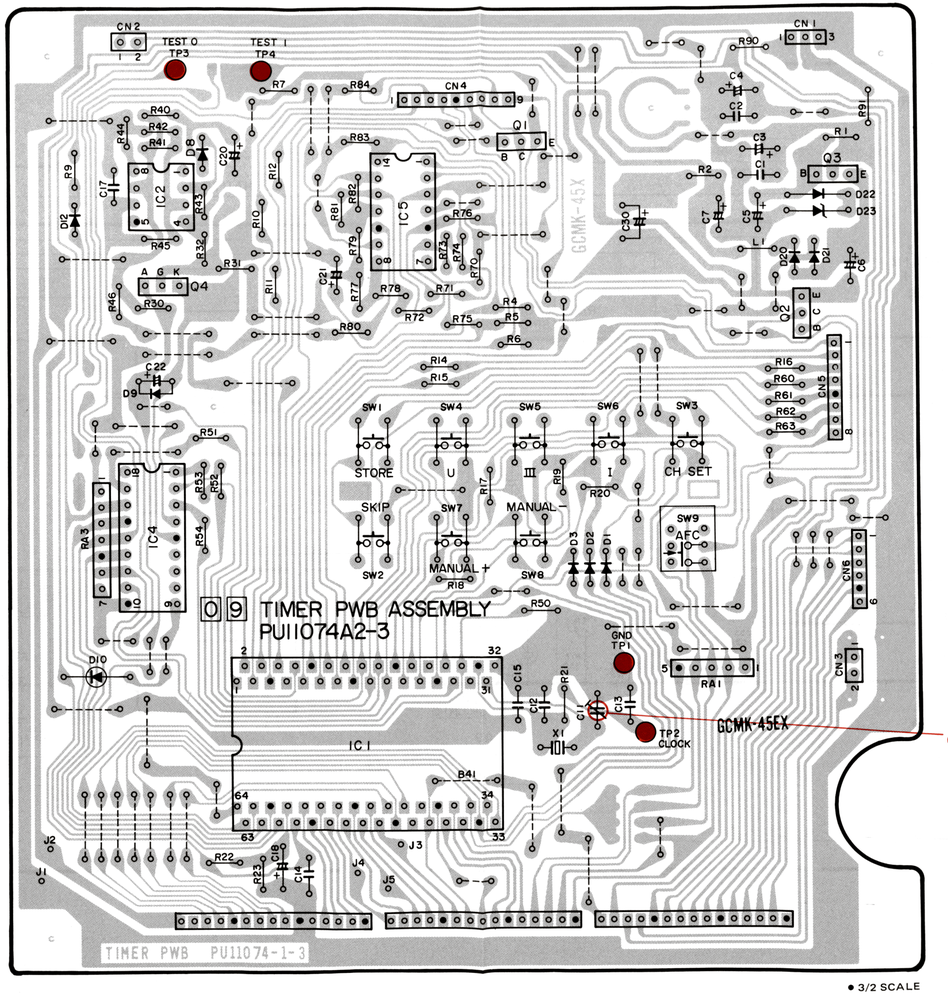
– DISPLAY –



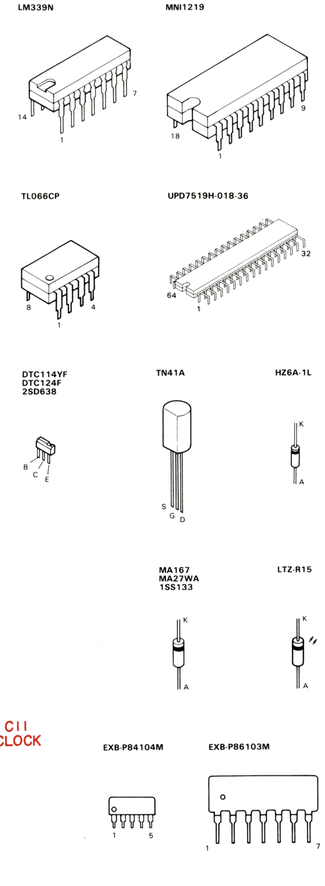
• 3/2 SCALE



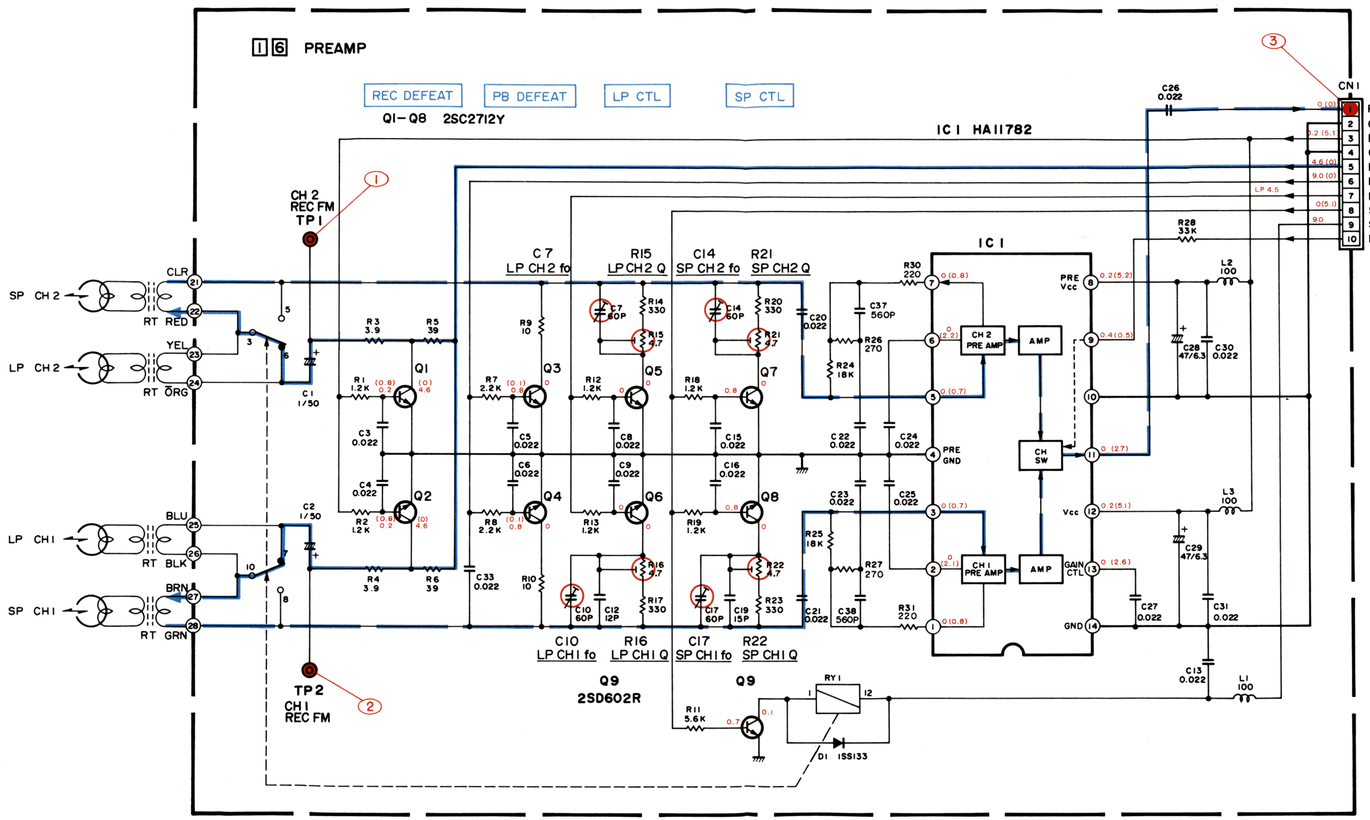
– TIMER –



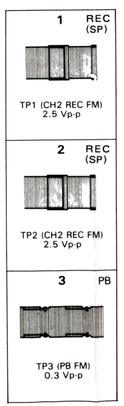
• 3/2 SCALE

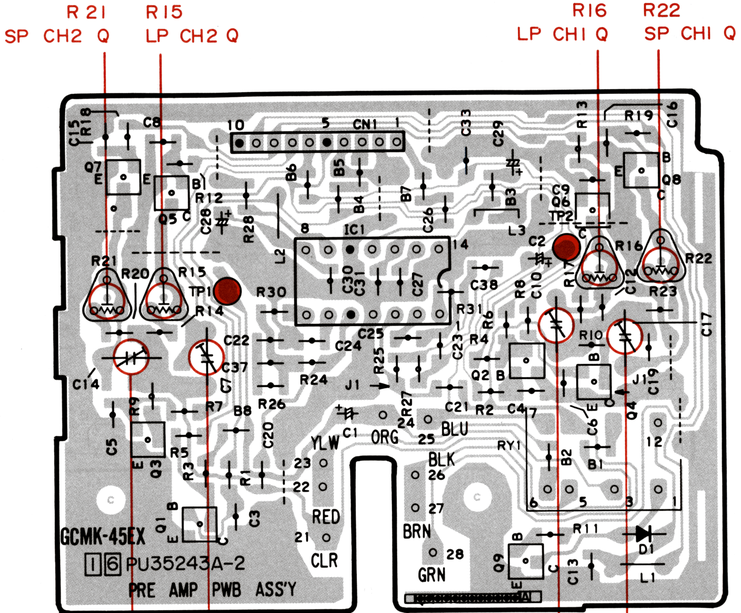


4.35 PREAMP SCHEMATIC DIAGRAM AND CIRCUIT BOARD

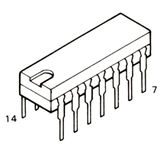


Waveforms of Preamp circuit

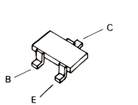




HA11782



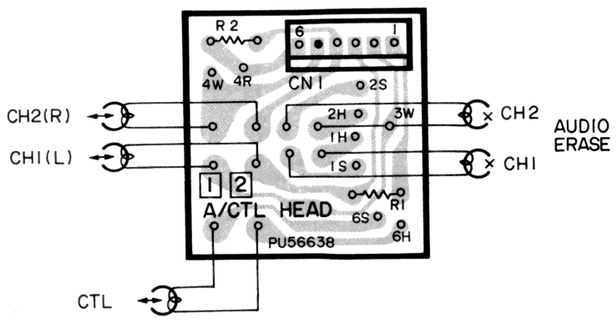
2SC2712 2SD602



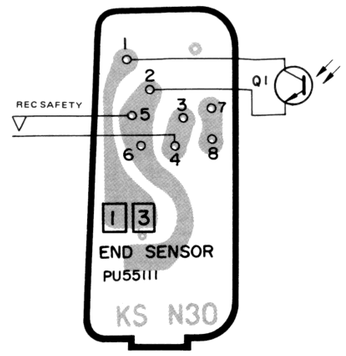
1SS133

4.36 OTHER CIRCUIT BOARDS

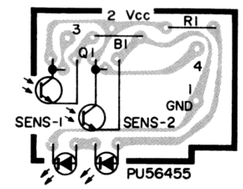
– 12 A/CTL HEAD –



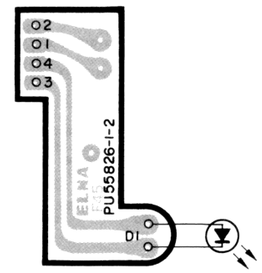
– 13 END SENSOR –



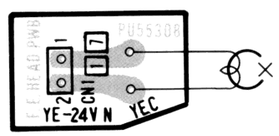
– 14 LOADING SENSOR –



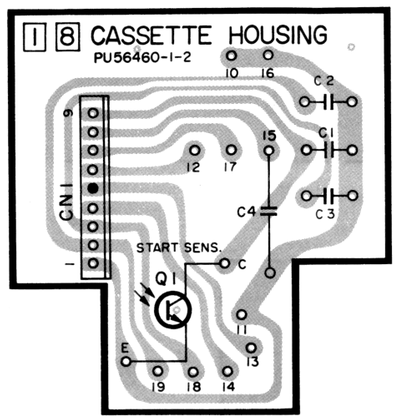
– 15 LED –



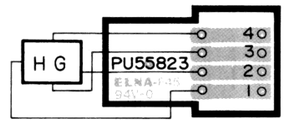
– 17 FULL ERASE HEAD –



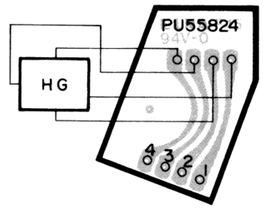
– 18 CASSETTE HOUSING –



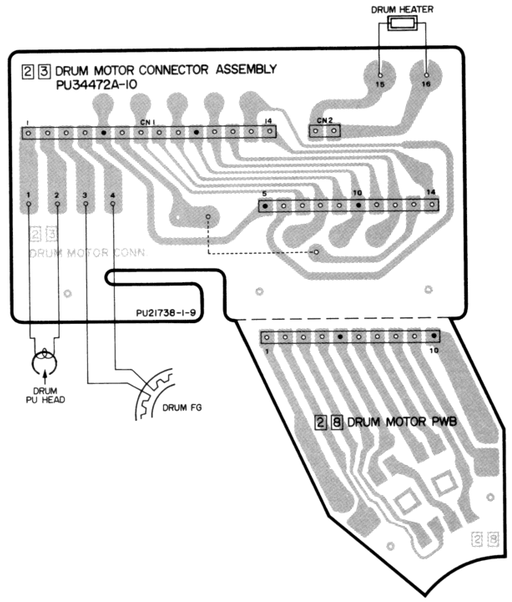
– 21 REEL SENSOR(SUP) –



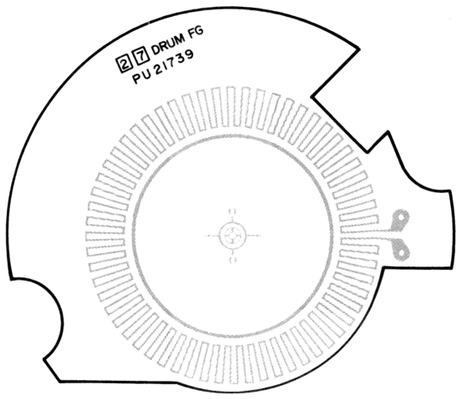
– 22 REEL SENSOR(TU) –



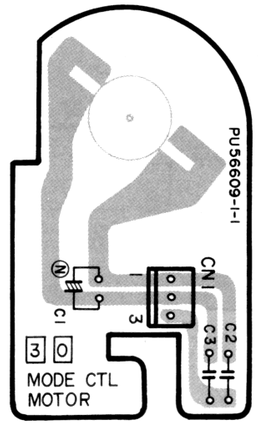
– 23 DRUM MOTOR CONNECTOR & 28 DRUM MOTOR –



– 27 DRUM FG –

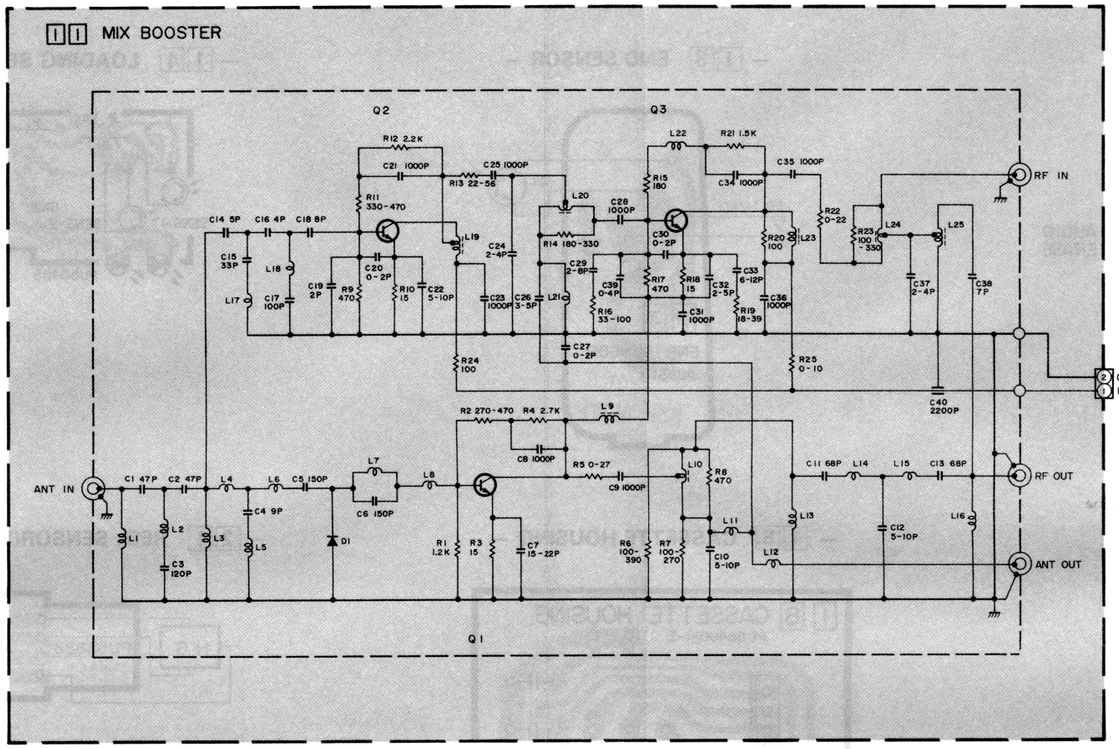


– 30 MODE CTL MOTOR –

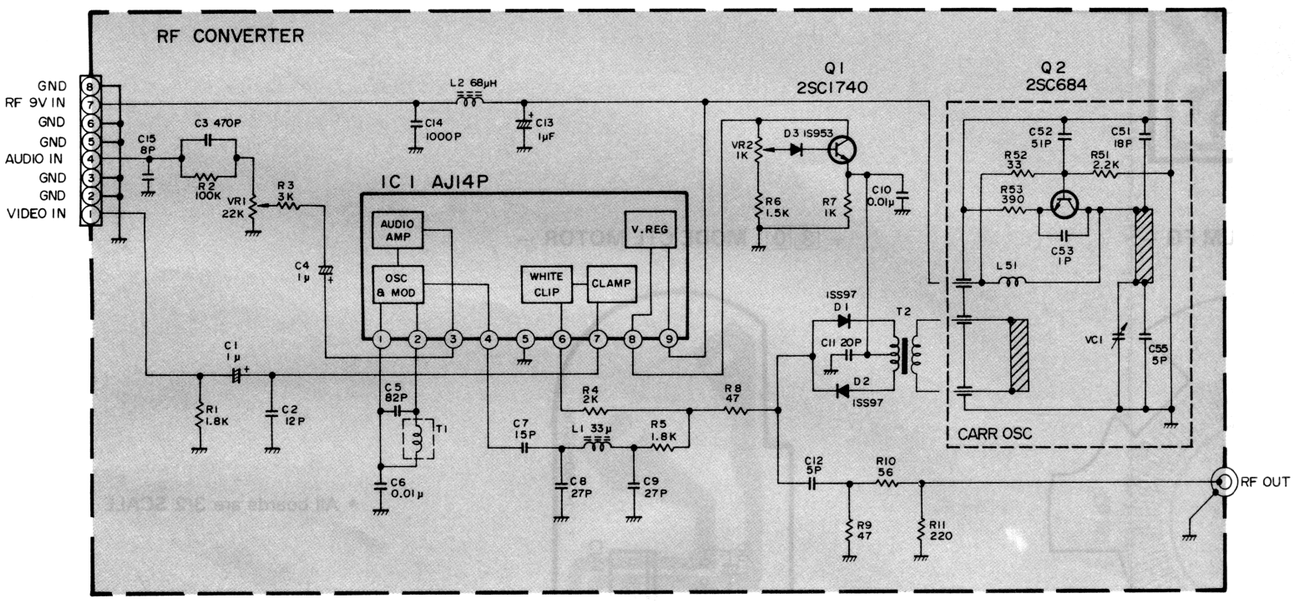


• All boards are 3/2 SCALE

4.37 MIX BOOSTER SCHEMATIC DIAGRAM

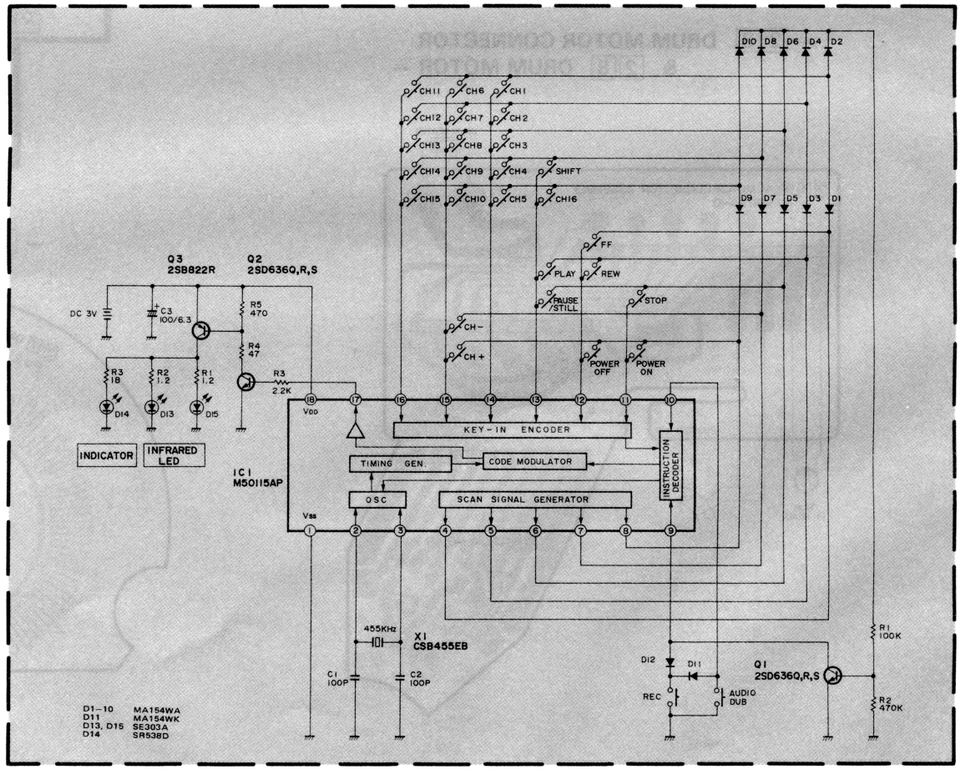


4.38 RF CONVERTER SCHEMATIC DIAGRAM

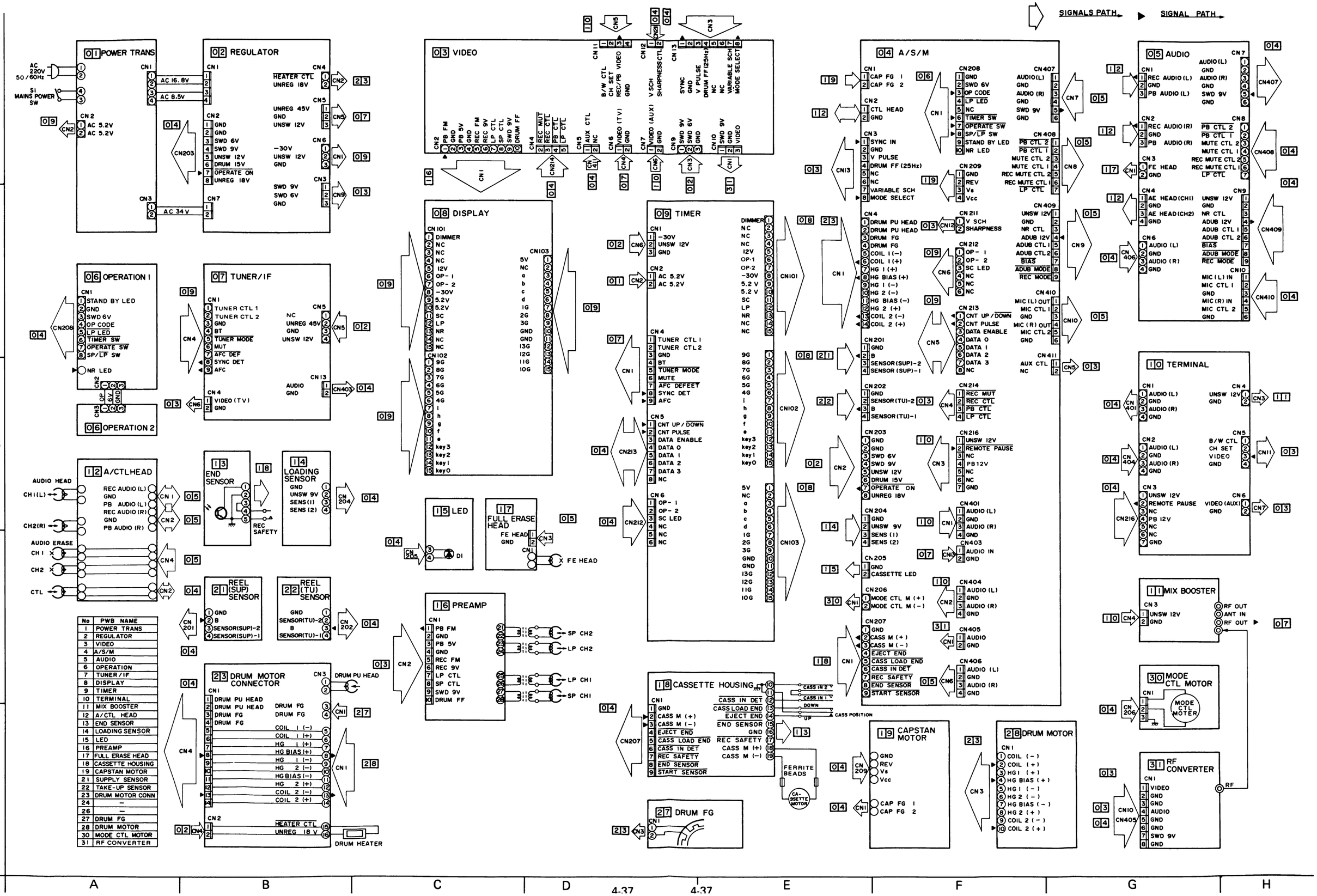


NOTE: Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.39 REMOTE CONTROL SCHEMATIC DIAGRAM

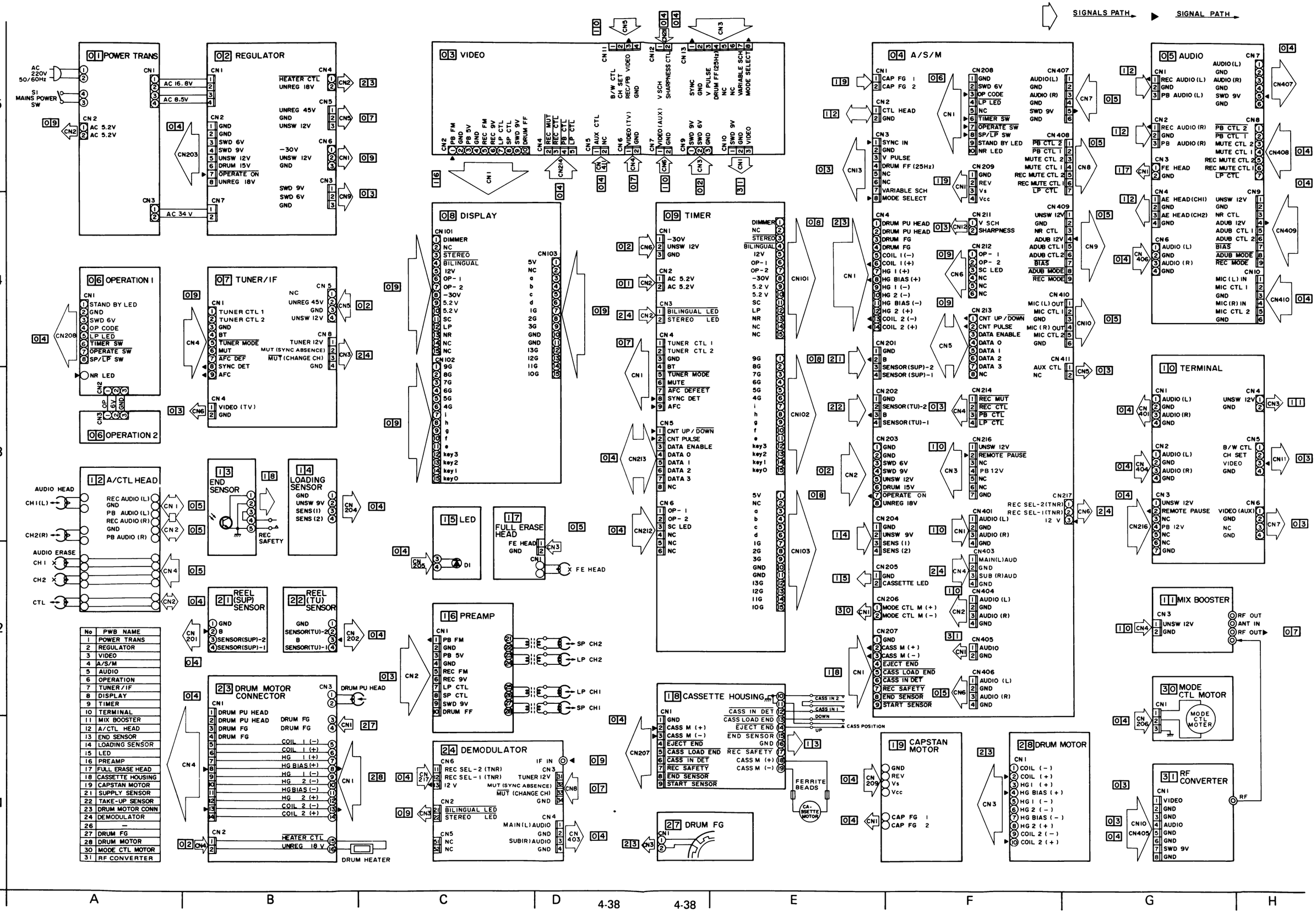


4.40 OVERALL WIRING DIAGRAM (E model)



No	PWB NAME
1	POWER TRANS
2	REGULATOR
3	VIDEO
4	A/S/M
5	AUDIO
6	OPERATION
7	TUNER/IF
8	DISPLAY
9	TIMER
10	TERMINAL
11	MIX BOOSTER
12	A/CTL HEAD
13	END SENSOR
14	LOADING SENSOR
15	LED
16	PREAMP
17	FULL ERASE HEAD
18	CASSETTE HOUSING
19	CAPSTAN MOTOR
21	SUPPLY SENSOR
22	TAKE-UP SENSOR
23	DRUM MOTOR CONN
24	–
26	–
27	DRUM FG
28	DRUM MOTOR
30	MODE CTL MOTOR
31	RF CONVERTER

4.41 OVERALL WIRING DIAGRAM (EB/EG models)



No	PWB NAME
1	POWER TRANS
2	REGULATOR
3	VIDEO
4	A/S/M
5	AUDIO
6	OPERATION
7	TUNER/IF
8	DISPLAY
9	TIMER
10	TERMINAL
11	MIX BOOSTER
12	A/CTL HEAD
13	END SENSOR
14	LOADING SENSOR
15	LED
16	PREAMP
17	FULL ERASE HEAD
18	CASSETTE HOUSING
19	CAPSTAN MOTOR
21	SUPPLY SENSOR
22	TAKE-UP SENSOR
23	DRUM MOTOR CONN
24	DEMODULATOR
26	—
27	DRUM FG
28	DRUM MOTOR
30	MODE CTL MOTOR
31	RF CONVERTER

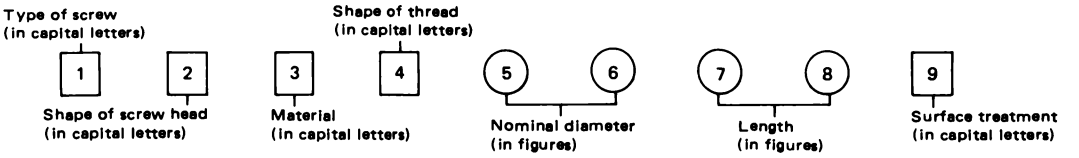
SECTION 5
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

5.1 STANDARD PART NUMBER CODING (Screw coding)

Standard screw part numbers are as follows.

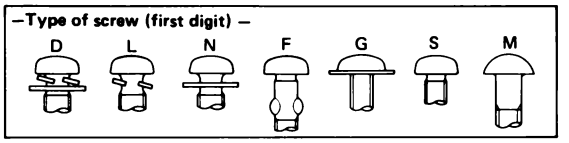


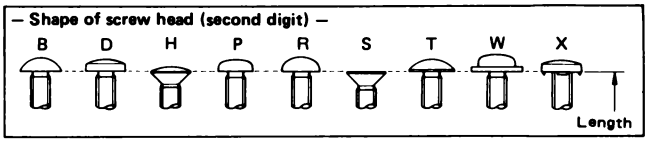
Type of screw (first digit)

- S Normal screws
- D Assembled screws (with plain and spring washers)
- L " (with spring washer)
- N " (with plain washer)
- F Feather screws
- G Washer head tapping screws
- M Wood screws

Shape of screw head (second digit)

- B Brazier head
- D Binding head
- H Oval countersunk head
- P Pan head
- R Round head
- S Flat head
- T Truss head
- W Washer head (machine screws)
- X Toothed head



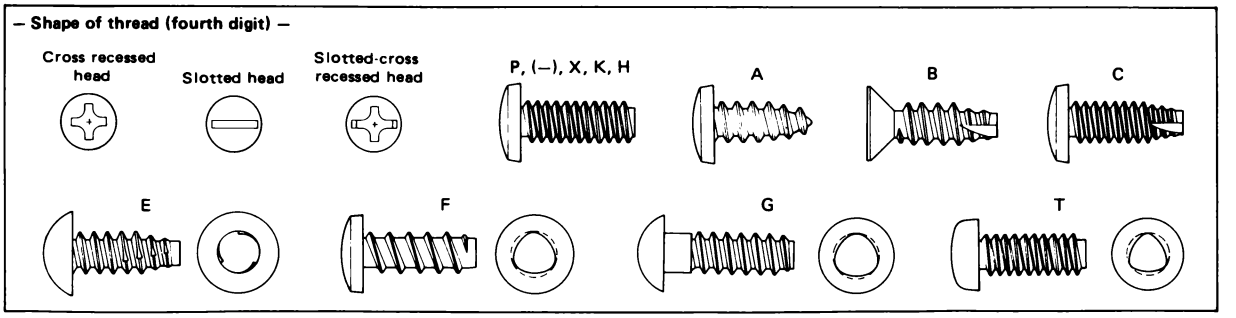


Material (third digit)

- S Steel
- E Stainless steel
- C Cast iron
- U Copper
- B Brass
- P Phosphor bronze
- N Nickel silver
- Y Cast brass
- A Aluminum
- Z Zinc alloy
- K Polycarbonate

Shape of thread (fourth digit)

- P Cross recessed head screws
- (–) Slotted head machine screws
- X Slotted-cross recessed head machine screws
- K Cross recessed head machine screws for precision equipment (type 1)
- H " (type 3)
- A Cross recessed head tapping screws (type 1)
- B " (type 2)
- C " (type 3)
- E Cross recessed head special tapping screws (brand : evertight)
- F " (brand : P-tight)
- T " (brand : taptight)
- G "



Nominal diameter (fifth and sixth digits)

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

Length (seventh and eighth digits)

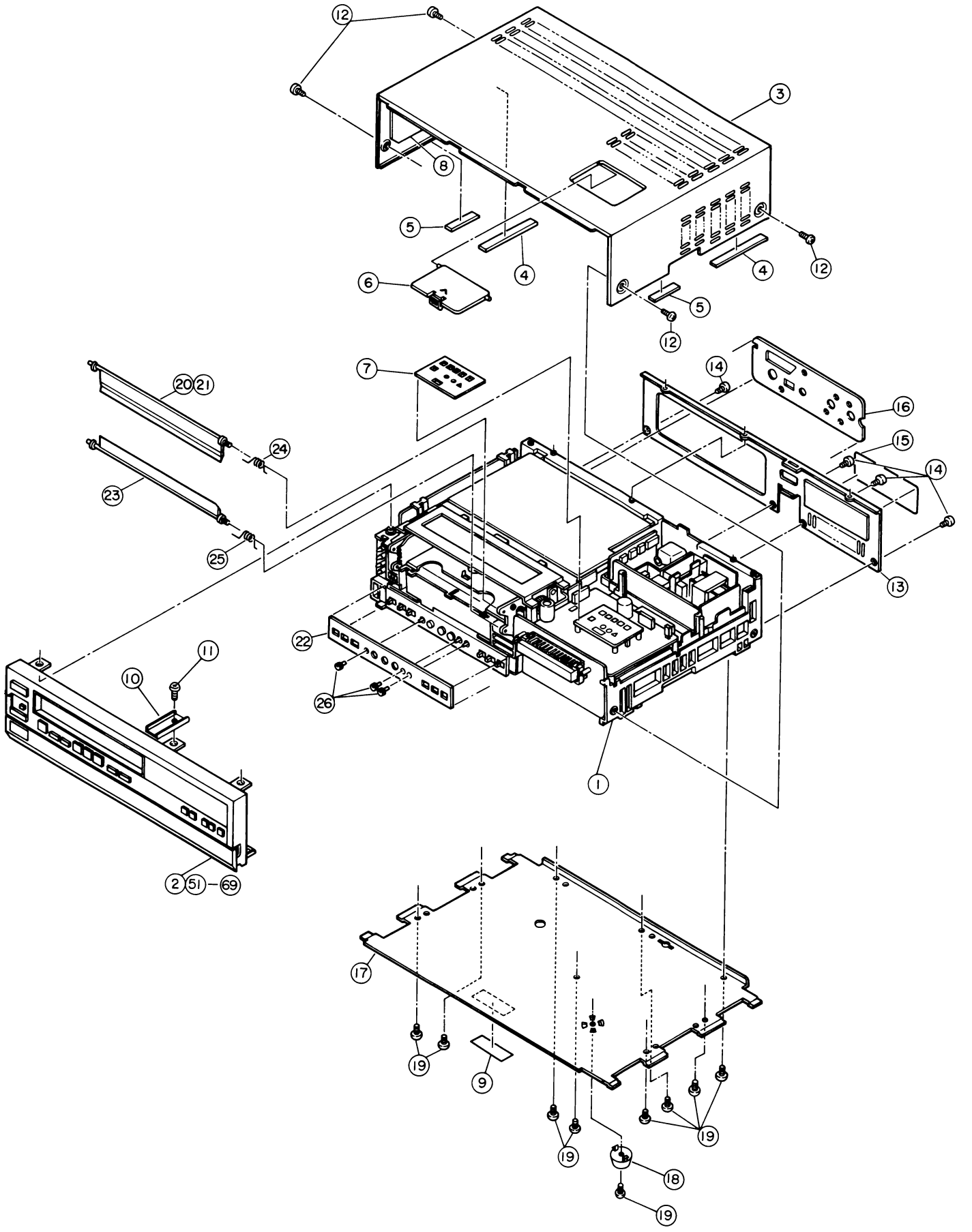
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

- Z Dichromate treatment after galvanizing (MFZn II-C)
- N Nickel plating (MFNi II, MFNi I)
- R Chromium plating (MBCr II, MBCr I)
- G Silver plating (SP4)
- B Black coating after plating
- F Blackening of iron (FB)
- M Blackening after galvanizing
- K Pickling of brass (PF2)
- P Phosphate treatment
- W Uni-chrome plating
- L Coating with transparent paint
- A Coloring red after galvanizing (MFZn II-C)
- C Coloring blue after galvanizing (MFZn II-C)
- T Coloring green after galvanizing (MFZn II-C)
- V Coloring purple after galvanizing (MFZn II-C)

5.2 EXPLODED VIEWS AND PARTS LIST

5.2.1 Cabinet assembly [M1]



Cabinet assembly [M1]

Ref. No.	Part No.	Part Name	Description	Q'ty
1	—	Chassis Assembly	refer to [M2]	1
⚠ 2	PQ10117D-3	Front Panel Assembly	E, Incl. 51—69 (Front Panel components)	1
⚠	PQ10117C-3	Front Panel Assembly	EB, Incl. 51—69 (Front Panel components)	1
⚠	PQ10117A-3	Front Panel Assembly	EG, Incl. 51—69 (Front Panel components)	1
⚠ 3	PQ10056-9	Top Cover		1
4	PU56840	Edge Cover	rear	2
5	PU56840-2	Edge Cover	front	2
6	PQ30209-9-2	Channel Cover	Top Cover	1
7	PQ30195-5-14	Channel Set Label	E/EB, on the Timer board	1
	PQ30195-3-14	Channel Set Label	EG, on the Timer board	1
8	PQ40881	Spacer	left side of Top Cover	1
9	PU52047-3	Label (Dolby)	E/EB, Bottom Plate	1
	PU52047-4	Label (Dolby)	EG, Bottom Plate	1
10	PU57011-1-2	Bracket	Front Panel	1
11	SDSF3012Z	Tapping Screw	Bracket	1
12	SDSP3010R	Screw	Top Cover	4
⚠ 13	PQ10039-8	Rear Panel	E/EB	1
⚠	PQ10039-7	Rear Panel	EG	1
14	SDSF3010M	Tapping Screw	Rear Panel	4
⚠ 15	PU34697-10	Rating Label	E	1
⚠	PU34697-9	Rating Label	EB	1
⚠	PU34697-7	Rating Label	EG	1
⚠ 16	PQ20122-2	Connector Label	E	1
⚠	PQ20119-2-4	Connector Label	EB	1
⚠	PQ20119-1-5	Connector Label	EG	1
⚠ 17	PQ10119-1-1	Bottom Plate		1
18	PQ41156	Foot	Bottom Plate	1
19	SDSF3010R	Tapping Screw	Bottom Plate	9
20	PQ30107BS-19	Upper Door Assembly	Incl. 21, Cassette Housing	1
21	PQ30117-16	Plate	Upper Door front side	1
22	PQ20118-2	Jack Board Label	E, A/S/M Board	1
	PQ20118-8	Jack Board Label	EB, A/S/M Board	1
	PQ20118-1-7	Jack Board Label	EG, A/S/M Board	1
23	PQ30030-8-15	Lower Door	Cassette Housing	1
24	PQ40104-2	Upper Torsion Spring	Upper Door Assembly	1
25	PQ40472	Lower Torsion Spring	Lower Door	1
26	PQ40792-1-2	Volume Knob (B)	A/S/M Board	3

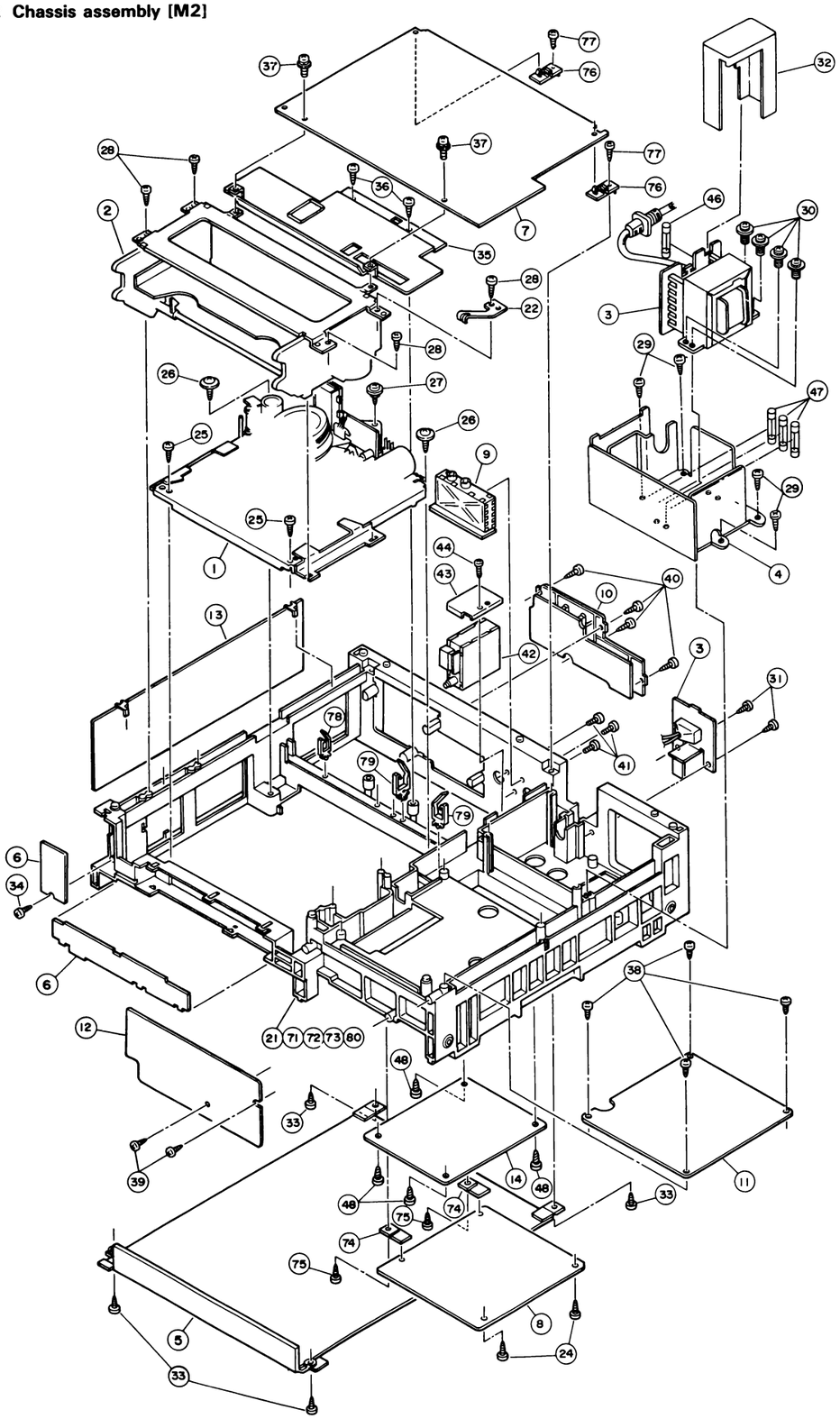
— Front panel components —

Ref. No.	Part No.	Part Name	Description	Q'ty
51	PQ30392	OTR Button	INSTANT REC	1
52	PQ30391-3	CHANNEL Button	CNT/RESET, CNT/LAP	2
53	PQ30391	CHANNEL Button	—	1
54	PQ30391-2	CHANNEL Button	+	1
55	PQ30414-2-4	Program Plate	E/EB, TIMER Set Buttons	1
	PQ30414-1-4	Program Plate	EG, TIMER Set Buttons	1
56	PQ30388-5	OPERATION Button (L)	E/EB, EJECT	1
	PQ30388	OPERATION Button (L)	EG, EJECT	1
57	PQ30388-6	OPERATION Button (L)	E/EB, PAUSE/STILL	1
	PQ30388-2	OPERATION Button (L)	EG, PAUSE/STILL	1
58	PQ30388-7	OPERATION Button (L)	E/EB, PLAY	1
	PQ30388-3-4	OPERATION Button (L)	EG, PLAY	1
59	PQ30388-4	OPERATION Button (L)	STOP	1
60	PQ30389-1-3	OPERATION Button (S)	AUDIO DUB	1
61	PQ30389-2	OPERATION Button (S)	REC	1
62	PQ30389-3	OPERATION Button (S)	REW	1
63	PQ30389-4	OPERATION Button (S)	FF	1
64	PQ41259	SP/LP Button		1
65	PQ41392B-1	POWER Button Assembly	E/EB, OPERATE	1
	PQ41392A-1	POWER Button Assembly	EG, OPERATE	1
66	PQ41260-2	TIMER Button	E/EB	1
	PQ41260	TIMER Button	EG	1
67	PQ41254	Cap	OPERATE, TIMER, LP/SP Buttons	3
68	PQ20037K	Door Assembly	E	1
	PQ20037J	Door Assembly	EB	1
	PQ20037G-8	Door Assembly	EG	1
69	PQM30002-63	Spring	OPERATE, TIMER, LP/SP Buttons	3

NOTES: [M] indicate mechanical symbol number.
E/EB refers to use in E and EB models.

5-3

5.2.2 Chassis assembly [M2]



Chassis assembly [M2]

Ref. No.	Part No.	Part Name	Description	Q'ty
1	—	Mechanism Assembly (1 & 2)	refer to [M3] and [M4]	1
2	—	Cassette Housing Assembly	refer to [M5]	1
3	—	Power Transformer Assembly	refer to [01]	1
4	—	Regulator Board Assembly	refer to [02]	1
5	—	A/S/M Board Assembly	refer to [04]	1
6	—	Operation Board Assembly	refer to [06]	1
7	—	Video Board Assembly	refer to [03]	1
8	—	Tuner/IF Board Assembly	refer to [07]	1
9	—	Mix Booster Board Assembly	refer to [11]	1
10	—	Terminal Board Assembly	refer to [10]	1
11	—	Timer Board Assembly	refer to [09]	1
12	—	Display Board Assembly	refer to [08]	1
13	—	Audio Board Assembly	refer to [05]	1
14	—	Demodulator Board Assembly	EB/EG, refer to [24]	1
⚠ 21	—	Chassis Assembly	Incl. 71—80 (Chassis components)	1
22	PQ41153	Earth Plate	Cassette Housing right side	1
23	—	—	—	—
24	SDSF3010Z	Tapping Screw	Tuner/IF Board	2
25	SDSA4012C	Tapping Screw	Main Deck	2
26	PQ40413	Special Screw	Main Deck	2
27	PQ41396	Special Screw	Main Deck rear side	1
28	SDSF3010Z	Tapping Screw	Cassette Housing	4
⚠ 29	SDSA4012C	Tapping Screw	Heat Sink	4
⚠ 30	DPSP4008Z	Screw	Power Transformer	4
⚠ 31	SDSF3010Z	Tapping Screw	Power Bracket	2
⚠ 32	PQ30412	AC Cover	Power Transformer	1
33	SDSF3010R	Tapping Screw	A/S/M Board	4
34	SDSF3010Z	Tapping Screw	Operation Board	1
35	PQ20094	Shield Cover	on the Main Deck	1
36	SDSF3010Z	Tapping Screw	Shield Cover	2
37	DPSP3006Z	Screw	Video Board	2
38	SDSF3010Z	Tapping Screw	Timer Board	4
39	SDSF3010Z	Tapping Screw	Display Board	2
40	SDSF3010M	Tapping Screw	Terminal Board	4
41	SDSP3008M	Screw	Mix Booster	3
⚠ 42	PU57128	RF Converter		1
43	PQ41154-1-1	Bracket	RF Converter	1
44	SDSF3010R	Tapping Screw	Bracket	1
45	—	—		—
⚠ 46	—	Fuse (F1)	refer to [01]	1
⚠ 47	—	Fuse (F3—F5)	refer to [02]	3
48	SDSF3010Z	Tapping Screw	EB/EG, Demodulator Board	4

NOTES: [M] indicate mechanical symbol number.
[2 digits] indicate circuit board symbol number.
EB/EG refers to use in EB and EG models.
Parts not denoted by parts numbers are not supplied by JVC.

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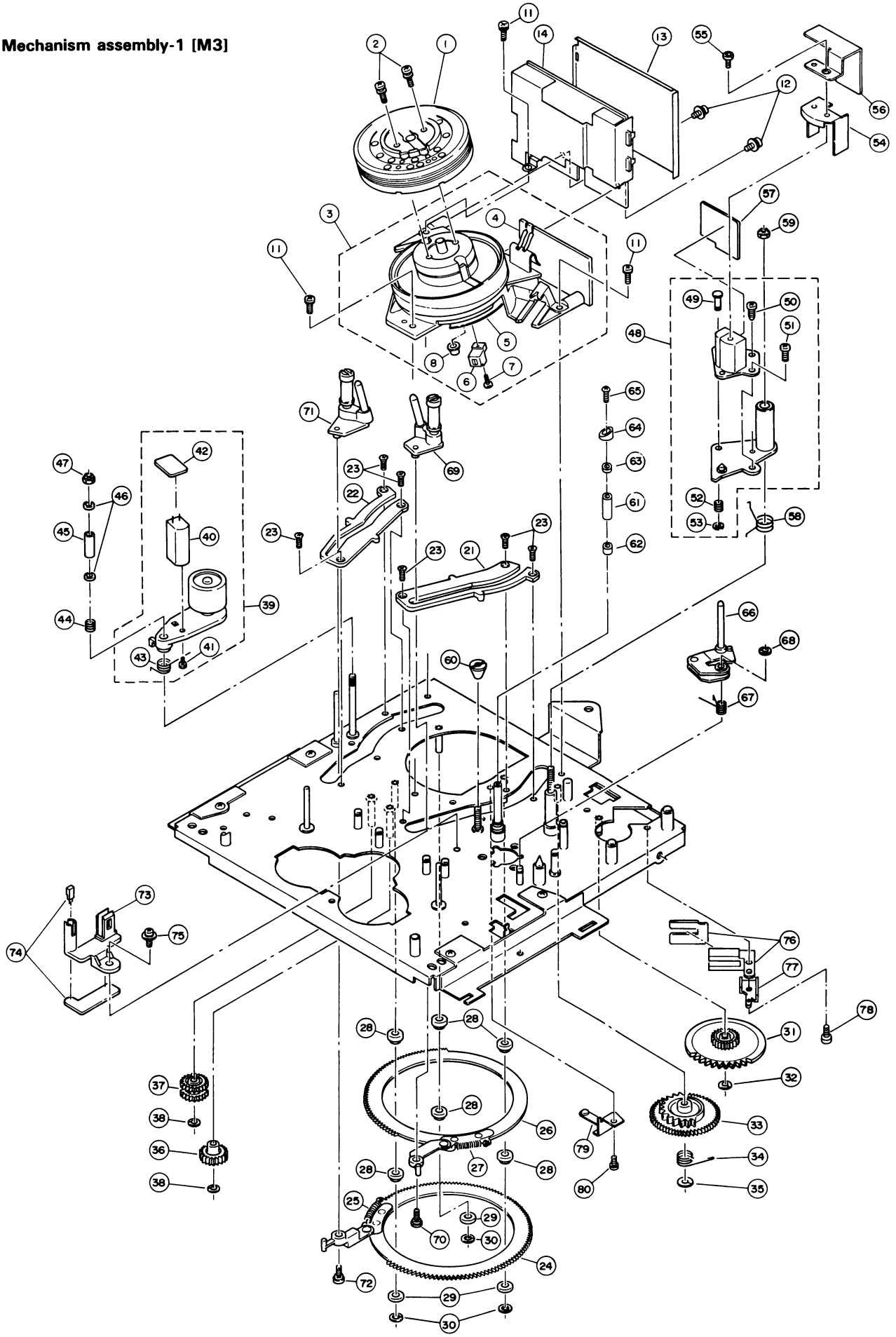
— Chassis components —

Ref. No.	Part No.	Part Name	Description	Q'ty
71	PU56719-2	Foot	bottom side	4
72	PU56778	Earth Bracket (B)	under the power transformer	1
73	SDSF3008Z	Tapping Screw	Earth Bracket (B)	1
74	PU55778-1-3	Hinge	Tuner/IF Board	2
75	SDSF3008Z	Tapping Screw	hinge of Tuner/IF Board	2
76	PU56280-1-1	Hinge	Video Board	2
77	SDSF3008Z	Tapping Screw	hinge of Video Board	2
78	PU54969-2	Wire Clamp	small	1
79	PU54969	Wire Clamp	large	2
80	SDSF3008R	Tapping Screw	bottom rear side	1

5.2.3 Mechanism assembly-1 [M3]



Mechanism assembly-1 [M3]

Ref. No.	Part No.	Part Name	Description	Q'ty
1	PQ20014C	Upper Drum Assembly		1
2	NDBP2608N	Screw	Upper Drum Assembly	2
⚠ 3	PQ20024E-10	Lower Drum Motor Assembly	Incl. 4—8	1
4	—	Drum Motor Conn. Board Assembly	refer to [23]	1
5	—	Drum FG Board	refer to [27]	1
6	PQ40352A-2	Pick-up Head Assembly	or PQ40352D	1
7	SPSH1735Z	Mini Screw	Pick-up Head Assembly	1
8	PU49483-3	Commutator		1
11	LPSP3008Z	Screw	Drum Assembly	3
12	DPSP2606Z	Screw	Preamp Board	2
13	PQ41219-1-1	Shield Case	Preamp Board	1
14	—	Preamp Board Assembly	refer to [16]	1
21	PQ30198	Loading Guide (TU)		1
22	PQ30199	Loading Guide (SUP)		1
23	PQ41269	Special Screw	Loading Guide (TU/SUP)	6
24	PQ40223A-1	Loading Ring Assembly (SUP)	Incl. 25	1
25	PQM30001-151	Spring		1
26	PQ40227A-1	Loading Ring Assembly (TU)	Incl. 27	1
27	PQM30001-151	Spring		1
28	PQ40213	Collar	Loading Ring (TU/SUP)	6
29	PQM30005-29	Collar		3
30	PQM30017-4	Slit Washer		3
31	PQ30192B-2	Loading Gear (1) Assembly		1
32	PQM30017-12	Slit Washer		1
33	PQ30193-1-2	Loading Gear (2)		1
34	PQ40966	Torsion Spring		1
35	PQM30017-13	Slit Washer		1
36	PQ40219	Connect Gear (1)	right	1
37	PQ40220	Connect Gear (2)	left	1
38	PQM30017-8	Slit Washer	Connect Gear (1&2)	2
39	PQ40368B-3	Full Erase Head Arm Assembly	Incl. 40—43	1
40	PU51263-2	Full Erase Head		1
41	LPSP2004Z	Screw		1
42	—	Full Erase Head Board	refer to [17]	1
43	PQ40427	Torsion Spring		1
44	PQM30002-112	Spring	SUP Guide Pole	1
45	PU53629-2	Tape Guide	SUP Guide Pole	1
46	PQ40752	Guide Frange	SUP Guide Pole	2
47	PQ40353	Nylon Nut	SUP Guide Pole	1
48	PQ30200C-3	A/CTL Head Assembly	Incl. 49—53	1
49	PQ40343	Pin		1
50	PQ40435	Screw		1
51	PQ40471	Screw		1
52	PQM30002-123	Spring		1
53	REE2500	E-Ring		1
54	PU54557-1-4	Shield Cap	A/CTL Head Assembly	1
55	HPSP1725N	Screw	A/CTL Head Assembly	1
56	PQ40767-1-4	Bracket	A/CTL Head Assembly	1
57	—	A/CTL Head Board	refer to [12]	1
58	PQ40428	Torsion Spring	A/CTL Head Assembly	1
59	PU49276	Nylon Nut	A/CTL Head Assembly	1
60	PQ40922	Taper Nut	A/CTL Head phase adjustment	1

Ref. No.	Part No.	Part Name	Description	Q'ty
61	PU53629-2	Tape Guide	TU Guide Pole	1
62	PQ41348-2	Guide Flange	TU Guide Pole	1
63	PQ40268-2	Guide Flange	TU Guide Pole	1
64	PQ41346	Guide Pole Cap	TU Guide Pole	1
65	SDSP2006Z	Screw	TU Guide Pole	1
66	PQ40422C-6	Guide Arm Assembly	for reverse play back	1
67	PQ40430	Torsion Spring	Guide Arm Assembly	1
68	PQM30017-8	Slit Washer	Guide Arm Assembly	1
69	PQ40354F	Pole Base Assembly (TU)		1
70	PQ40295	Flange Screw	TU Loading Ring	1
71	PQ40357A	Pole Base Assembly (SUP)	or PQ40357B	1
72	PQ40295	Flange Screw	SUP Loading Ring	1
73	PQ30242-1-1	LED Holder		1
74	—	LED Board	refer to [15]	1
75	DPSP3006Z	Screw	LED Holder	1
76	—	Loading Sensor Board	refer to [14]	1
77	PQ40765	Spring Holder		1
78	SPSP3006Z	Screw	Spring Holder	1
79	PU56930	Brush Assembly	under the commutator	1
80	LPSP3004Z	Screw		1

NOTES: [M] indicate mechanical symbol number.
[2 digits] indicate circuit board symbol number.

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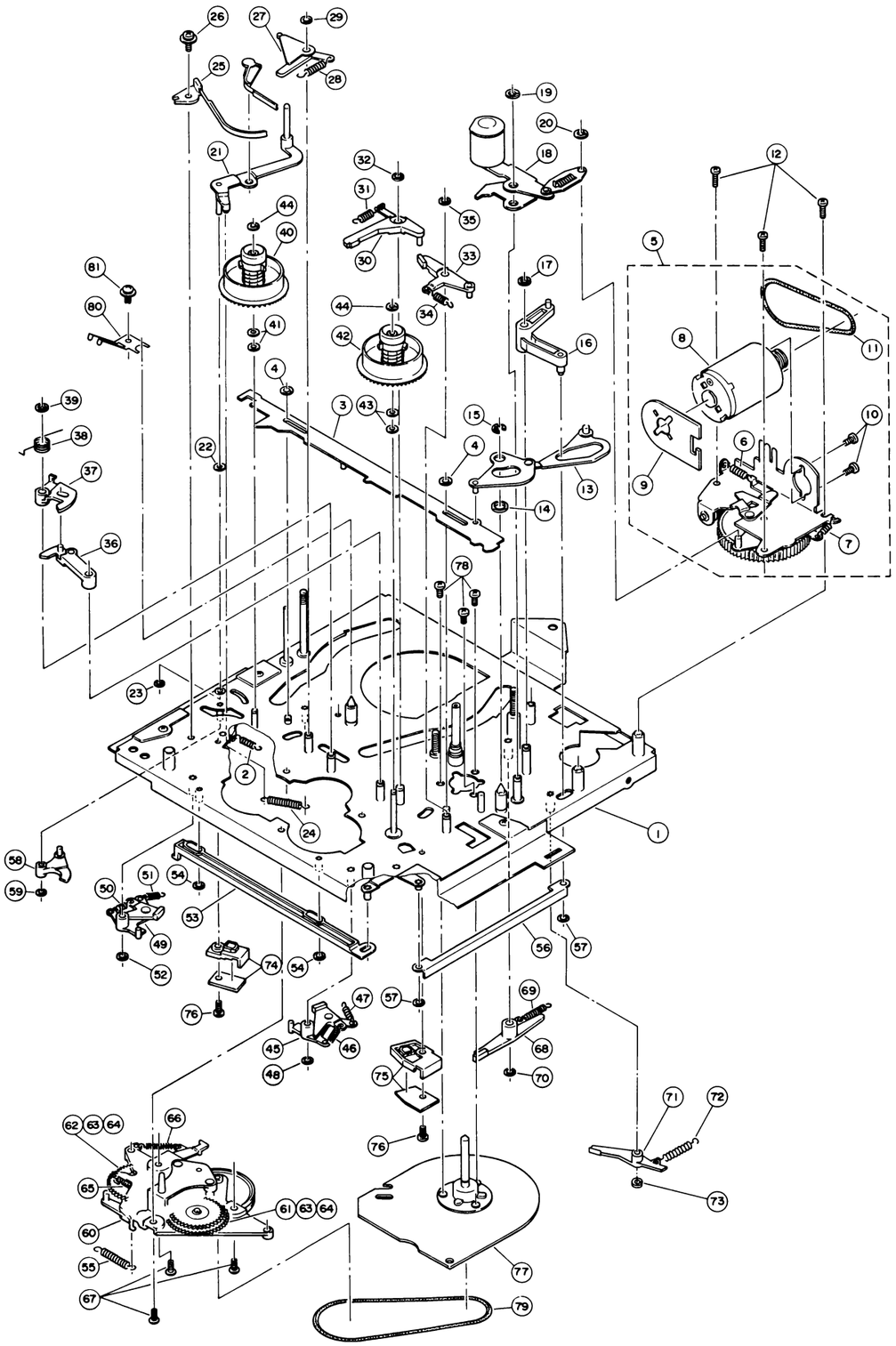
5.2.4 Mechanism assembly-2 [M4]



Mechanism assembly-2 [M4]

Ref. No.	Part No.	Part Name	Description	Q'ty
1	—	Main Deck Assembly	Incl. 2	1
2	PQM30001-127	Spring	Cancel Lever Assembly	1
3	PQ30130A	Slide Plate Assembly		1
4	PQM30017-8	Slit Washer		2
5	PUS36689F	Drive Gear Bracket Assembly	Incl. 6—11	1
6	PQM30001-129	Spring		1
7	PQM30001-130	Spring		1
⚠ 8	PQ40244A-2	Motor Assembly	mode control	1
9	—	Mode Control Motor Board	refer to [30]	1
10	SPSP3003Z	Screw	mode control motor	2
11	PQM30003-14	Belt	mode control	1
12	SDSP2608Z	Screw	Drive Gear Bracket Assembly	3
13	PQ40246A	Lever Assembly		1
14	PQM30005-41	Collar		1
15	REE4000	E-Ring		1
16	PQ40250B	Cam Arm Assembly		1
17	PQM30017-12	Slit Washer		1
18	PQ40252B-2	Pinch Roller Arm Assembly		1
19	PQM30017-12	Slit Washer		1
20	PQM30017-8	Slit Washer		1
21	PQ40259A	Tension Arm Assembly		1
22	Q03093-829	Washer	Tension Arm Assembly	1
23	PQM30017	Slit Washer	Tension Arm Assembly	1
24	PQM30001-172	Spring	Tension Arm Assembly	1
25	PQ40262D	Tension Band Assembly		1
26	DPSP3006Z	Screw		1
27	PQ40274A-2	Loading Brake Assembly (SUP)	Incl. 28	1
28	PQM30001-175	Spring		1
29	PQM30017-12	Slit Washer	Loading Brake Assembly (SUP)	1
30	PQ40276A-2	Loading Brake Assembly (TU)	Incl. 31	1
31	PQM30001-171	Spring		1
32	PQM30017-12	Slit Washer	Loading Brake Assembly (TU)	1
33	PQ40279A-1	Search Brake Assembly	Incl. 34	1
34	PQM30001-164	Spring		1
35	PQM30017-12	Slit Washer	Search Brake Assembly	1
36	PQ40282A-3	Gear Lever Assembly (TU)		1
37	PQ40284-1-2	Gear Lever (SUP)		1
38	PQ41162-1-2	Torsion Spring		1
39	PQM30017-13	Slit Washer	Gear Lever (SUP)	1
40	PU55820-1-3	Reel Disk (SUP)		1
41	Q03093-828	Washer	Reel Disk hight adjustment	2
42	PU55821-1-2	Reel Disk (TU)		1
43	Q03093-828	Washer	Reel Disk hight adjustment	2
44	PQM30017-5	Slit Washer	Reel Disk (SUP/TU)	2
45	PQ40285A	Main Brake Assembly (TU)	Incl. 46 and 47	1
46	PQM30001-135	Spring		1
47	PQM30001-136	Spring		1
48	PQM30017-12	Slit Washer	Main Brake Assembly (TU)	1
49	PQ40288A	Main Brake Assembly (SUP)	Incl. 50 and 51	1
50	PQM30001-135	Spring		1
51	PQM30001-136	Spring		1
52	PQM30017-12	Slit Washer	Main Brake Assembly (SUP)	1
53	PQ30133	Main Brake Slider		1
54	PQM30017-8	Slit Washer	Main Brake Slider	2
55	PQM30001-178	Spring	to Clutch Mechanism Assembly	1

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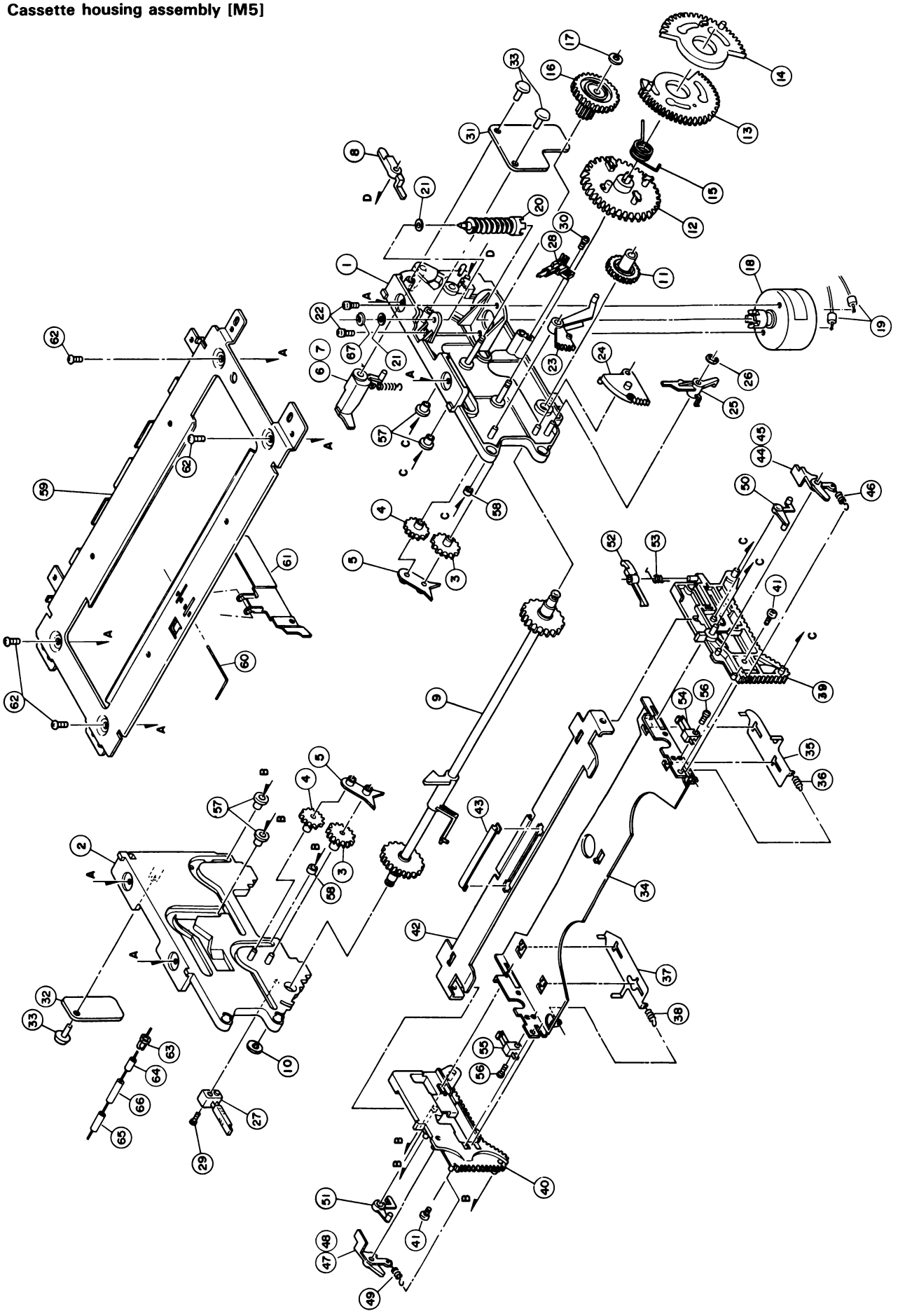
Ref. No.	Part No.	Part Name	Description	Q'ty
56	PQ40291	Push Plate	Cam Arm Assembly	1
57	PQM30017-8	Slit Washer	Push Plate	2
58	PQ40292A	Cancel Lever Assembly (2)		1
59	PQM30017-5	Slit Washer		1
60	PU55822A-8	Clutch Mechanism Assembly	Incl. 61—66	1
61	PU56043-1-2	Take-up Clutch		1
62	PU56044-1-2	Supply Clutch		1
63	Q03093-827	Washer	Clutch (TU/SUP)	2
64	PQM30017-2	Slit Washer	Clutch (TU/SUP)	2
65	PQM30001-140	Spring		1
66	PQM30001-139	Spring		1
67	SPSP3006Z	Screw	Clutch Mechanism Assembly	3
68	PQ40437A-3	Motor Brake Assembly	Incl. 69, capstan motor	1
69	PQM30001-138	Spring		1
70	PQM30017-12	Slit Washer		1
71	PQ40764A-1	Motor Brake Assembly (2)	Incl. 72, capstan motor	1
72	PQM30001-152	Spring		1
73	PQM30017-12	Slit Washer		1
74	—	Reel Sensor (SUP) Assembly	refer to [21]	1
75	—	Reel Sensor (TU) Assembly	refer to [22]	1
76	SPST3008Z	Screw	Reel Sensor Boards (SUP/TU)	2
⚠ 77	PU57421V	Capstan Motor Assembly	direct drive motor	1
78	SDSP2603Z	Screw	Capstan Motor Assembly	3
79	PQM30003-10	Belt	reel	1
80	PQ41282	Earth Plate	before the drum assembly	1
81	DPSP3005N	Screw	Earth Plate	1

NOTES: [M] indicate mechanical symbol number.
[2 digits] indicate circuit board symbol number.
Parts not denoted by parts numbers are not supplied by JVC.

5.2.5 Cassette housing assembly [M5]



Cassette housing assembly [M5]

Ref. No.	Part No.	Part Name	Description	Q'ty
–	PUS26805K	Cassette Housing Assembly	Incl. 1–67	1
1	PQ30033D-2	Guide Stay (R) Assembly		1
2	PQ30276B-1	Guide Stay (L) Assembly		1
3	PQ40059	Gear (1)	left and right	2
4	PQ40060	Gear (2)	left and right	2
5	PQ40061	Double Cap		2
6	PQ40102A	Door Guide Assembly	Incl. 7, Guide Stay (R)	1
7	PUM30001-111	Spring		1
8	PQ40063	Guide Lever	Guide Stay (R)	1
9	PQ40103A	Connect Gear Assembly		1
10	PUM30017-11	Slit Washer	Connect Gear Assembly	1
11	PQ40065	Cam Gear (2)	Guide Stay (R)	1
12	PQ30028	Cam Gear (1)		1
13	PQ40066	Loading Slide Gear		1
14	PQ40067	UL Slide Gear	unloading	1
15	PQ40068-2	Limiter Spring	Cam Gear (1)	1
16	PQ40484	Worm Wheel		1
17	PUM30017-4	Slit Washer	Worm Assembly	1
⚠ 18	PQ40090A	Motor Assembly	cassette motor	1
19	PU45811	Ferrite Beads	Motor Assembly	2
20	PQ40091B	Worm Assembly		1
21	Q03093-838	Washer	Worm Assembly	2
22	SPSP2604Z	Screw	Motor Assembly	2
23	PQ40074	Upper Door Opener		1
24	PQ40075-1-5	Lower Door Opener	cassette load end/eject end	1
25	PQ40076-1-5	Hold Lever	Lower Door Opener	1
26	REE2500X	E-Ring	Hold Lever	1
27	PU51259-3	Leaf Switch	rec safety, Guide Stay (L)	1
28	PU55377-2	End Switch		1
29	SPSP2010Z	Screw	Leaf Switch	1
30	SBSE2610Z	Tapping Screw	End Switch	1
31	–	Cassette Housing Board	refer to [18]	1
32	–	End Sensor Board	refer to [13]	1
33	PU48973-3	Stopper	Cassette Housing/End Sensor Boards	3
34	PQ30031-1-3	Cassette Holder		1
35	PQ40106B-1	Slide Plate (R) Assembly	Incl. 36	1
36	PUM30001-113	Spring		1
37	PQ40107B-1	Slide Plate (L) Assembly	Incl. 38	1
38	PUM30001-113	Spring		1
39	PQ10009-1-4	Bracket (Right)		1
40	PQ10009-2-3	Bracket (Left)		1
41	SPSP2003Z	Screw	Bracket (Right/Left)	2
42	PQ30208	Reinforcement		1
43	PQ40479	Guard	Reinforcement	1
44	PQ40108B-2	Lock Lever (R) Assembly	Incl. 45,46	1
45	PQM30019-10	Pad	Lock Lever (R)	1
46	PUM30001-110	Spring		1
47	PQ40109B-2	Lock Lever (L) Assembly	Incl. 48,49	1
48	PQM30019-10	Pad		1
49	PUM30001-110	Spring		1
50	PQ40081A	Switch Lever (R) Assembly	Insert Switch (R)	1
51	PQ40081B	Switch Lever (L) Assembly	Insert Switch (L)	1
52	PQ40083-1-1	Lid Opener	Bracket (R)	1
53	PQ40084-1-2	Torsion Spring	Lid Opener	1
54	PU55378-1-1	Insert Switch (Right)	cassette in detector	1
55	PU55378-2-1	Insert Switch (Left)	cassette in detector	1
56	SPSP1704Z	Screw	Insert Switch (R/L)	2
57	PQ40086	Roller	Guide Stay (Right/Left)	4
58	PQ40087-2	Mini Roller	Guide Stay (Right/Left)	2
59	PQ20043	Roof Plate		1
60	PQ40440-1-1	Rod	Roof Plte	1
61	PQ40478-1-3	Upper Door Stopper		1
62	SBSE2608Z	Tapping Screw	Roof Plate	4
63	PQ40299	Wire Cap	Guide Stay (L)	1
64	QXT629H-020	UL Tube		1
65	QXT329H-035	UL Tube		1
66	QXTF253-040	UL Tube		1
67	PUM30017	Slit Washer	Worm Assembly	1

NOTES: [M] indicate mechanical symbol number.
[2 digits] indicate circuit board symbol number.

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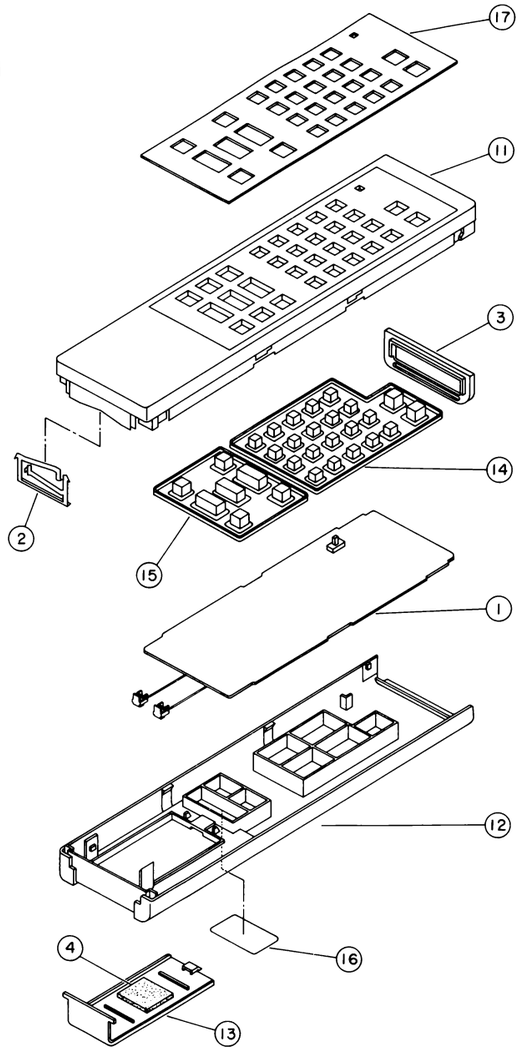
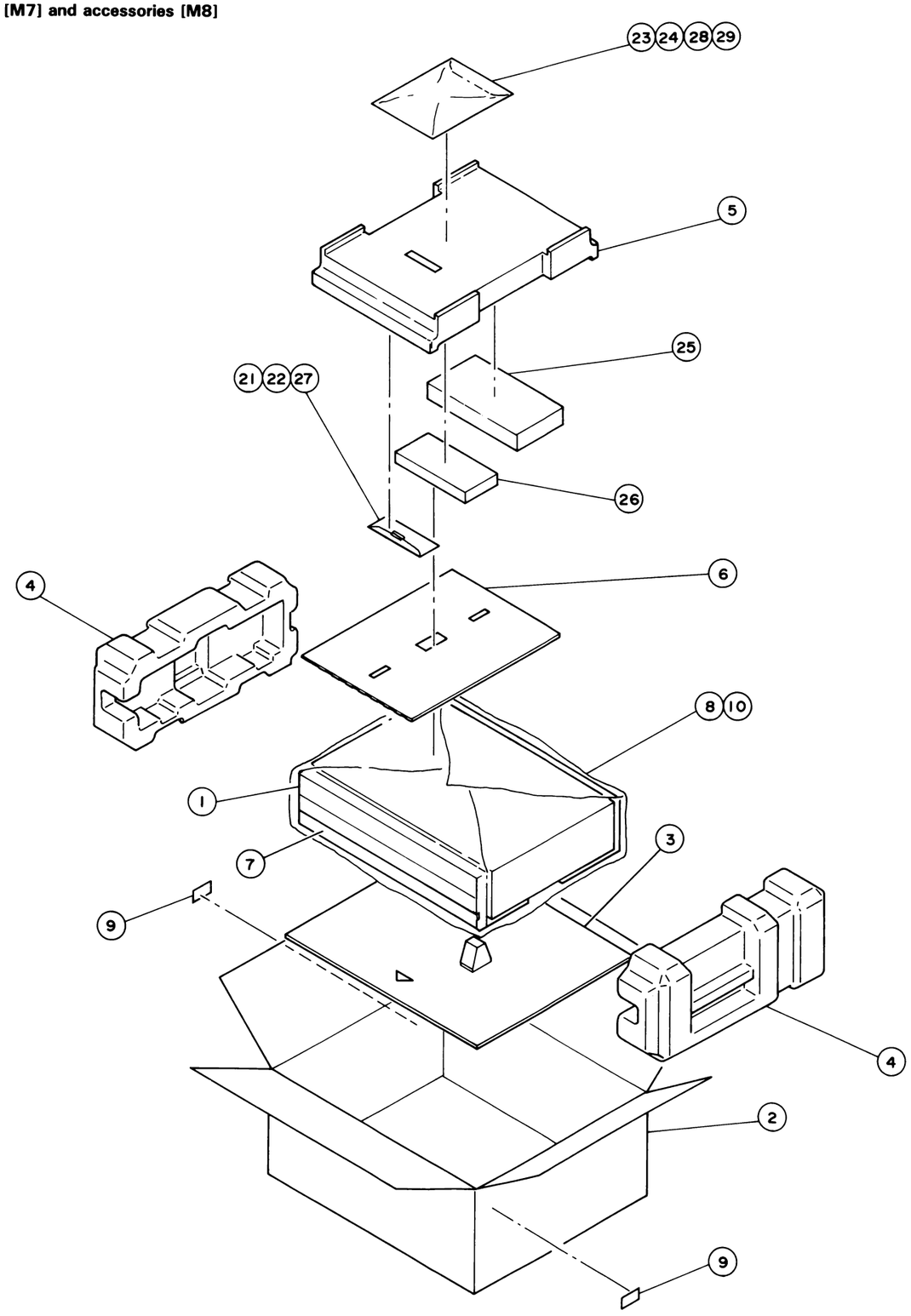
5.2.6 Remote control unit [M6]



Remote control unit [M6]

Ref. No.	Part No.	Part Name	Description	Q'ty
⚠ —	PU11099A	Remote Control Unit	EG, Incl. 1—5, 11—17	1
⚠ —	PU11099C	Remote Control Unit	E/EB, Incl. 1—5, 11—17	1
1	—	Remote Control Board Assembly	refer to [40]	1
2	PU11099-003	Electrode Plate (A)	Top Case	1
3	PU11099-005	Filter Window	infrared	1
4	PU11099-006	Cushion	Battery Cap	1
5	QPGA012-02505	Poly Bag	packing for unit	1
11	PU35424	Top Case		1
12	PU35423	Bottom Case		1
13	PU35422	Battery Cap		1
14	PU35420-4	Button (1)	EG	1
	PU35420-2	Button (1)	E/EB	1
15	PU35421	Button (2)		1
16	PU35432	Remote Control Label		1
17	PU35419	Top Panel	EG	1
	PU35419-3	Top Panel	E/EB	1

5.2.7 Packing [M7] and accessories [M8]



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Packing [M7] and accessories [M8]

Ref. No.	Part No.	Part Name	Description	Q'ty
1	—	Cabinet Assembly	refer to [M1]	1
2	PQ30189-31	Packing Case	E	1
	PQ30189-26-12	Packing Case	EB	1
	PQ30189-22-12	Packing Case	EG	1
⚠ 3	PU35153B	Sheet Assembly	under the set	1
4	PU34775A-5	Cushion Assembly		1
5	PQ20085-1-1	Accessory Case		1
6	PQ41033-1-1	Sheet	Accessory Case	1
7	PQ41027	Sheet	inside of Door Assembly	1
8	PQM30021-33	Poly Bag		1
9	PUP40329	Serial No. Sticker		2
10	PQ41026-1-1	Protect Sheet	on the Top Cover	1
⚠ 21	PU55906	Aerial Cable Assembly		1
22	QPGA020-02005	Poly Bag		1
⚠ 23	PU30425-692	Instructions	E	1
⚠	PU30425-684	Instructions	EB	1
⚠	PU30425-677	Instructions	EG	1
24	QPGA025-03505	Poly Bag		1
25	PTE-30-101	Cassette Tape		1
26	—	Remote Control Unit	refer to [M6]	1
27	UM-3DJ2P	Battery		1
⚠ 28	PU35247	F. IMF. Sheet	EG, FTZ information	1
29	BT-20069A	Warranty Card	EG	1

NOTES: [M] indicated mechanical symbol number.
[2 digits] indicate circuit board symbol number.
EG refers to use in EG model.

SECTION 6
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS—All resistance values are in ohms (Ω), unless otherwise indicated.

k	:	1,000 (Kilo)
M	:	1,000,000 (Mega)
Chip R	:	Chip Resistor
Chip VR	:	Chip Variable Resistor
Comp. R	:	Composition Resistor
CR	:	Carbon Film Resistor
FR	:	Fusible Resistor
MFR	:	Metal Film Resistor
MPR	:	Metal Plate Resistor
OMR	:	Oxide Metal Film Resistor
PMR	:	Precision Metal Film Resistor
UFR	:	Unflammable Resistor
VR	:	Variable Resistor (Potentiometer)
WR	:	Wire Wound Resistor

CAPACITORS—All capacitance values are in μF, unless otherwise indicated.

pF	: μμF (Pico farad)
C Cap	: Ceramic Capacitor
Chip Cap	: Chip Capacitor
Chip T Cap	: Chip Tantalum Capacitor
E Cap	: Electrolytic Capacitor
FM Cap	: Film Mica Capacitor
LL Cap	: Low Leak Current Electrolytic Capacitor
MM Cap	: Metalized Mylar Capacitor
MP Cap	: Metalized Paper Capacitor
MY Cap	: Mylar Capacitor
NP Cap	: Non-polar Capacitor
PC Cap	: Polycarbonate Capacitor
PP Cap	: Polypropylene Capacitor
PS Cap	: Polystyrol Capacitor
T Cap	: Tantalum Capacitor
TF Cap	: Thin Film Capacitor
TR Cap	: Trimmer Capacitor

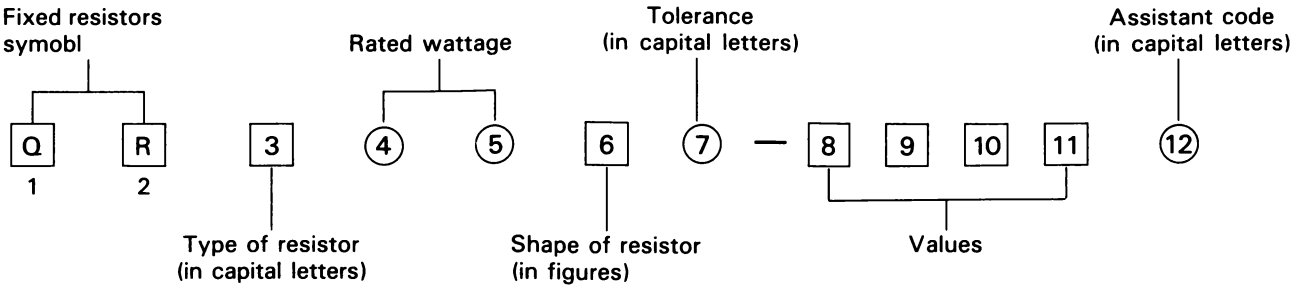
NOTES:

- [2 digits] indicate circuit board symbol number.
- "x2" indicates two pieces.
- (A) refers to use in "A" model.
- Parts not denoted by parts numbers are not supplied by JVC.

6.1 STANDARD PART NUMBER CODING

6.1.1 Fixed resistor coding

Fixed resistor part numbers are as follows.



Type of resistor (third digit)

C	Composition resistors
D	Carbon film resistors
F	Unflammable resistors
G	Oxide metal film resistors
H	Fusible resistors
M	Metal plate resistors
S	Metal glazed resistors
V	Precision metal film resistors
W	Wire wound resistors
X	Metal film resistors
Z	Special resistors

Rated wattage (fourth and fifth digits)

A0	1/10 W
18	1/8 W
16	1/6 W
14	1/4 W
12	1/2 W
01	1 W
02	2 W
03	3 W
04	4 W
05	5 W
06	6 W
07	7 W
75	7.5 W
08	8 W
10	10 W
15	15 W
A6	16 W
20	20 W
30	30 W

Tolerance (seventh digit)

F	±1 %
G	±2 %
J	±5 %
K	±10 %
M	±20 %

Assistant code (twelfth digit)

A	Small type
B	Small type
S	Small type
Y	Lead taping
Z	Lead taping

Values (eighth – tenth or eleventh digits)

examples:

R47		0.47 Ω
4R7		4.7 Ω
470	47×10^{0}	47 Ω
471	47×10^{1}	470 Ω
472	47×10^{2}	4.7 kΩ
473	47×10^{3}	47 kΩ
474	47×10^{4}	470 kΩ
475	47×10^{5}	4.7 MΩ

QRV resistance shown by four digits:

4640	464×10^{0}	464 Ω
4641	464×10^{1}	4.64 kΩ
4642	464×10^{2}	46.4 kΩ

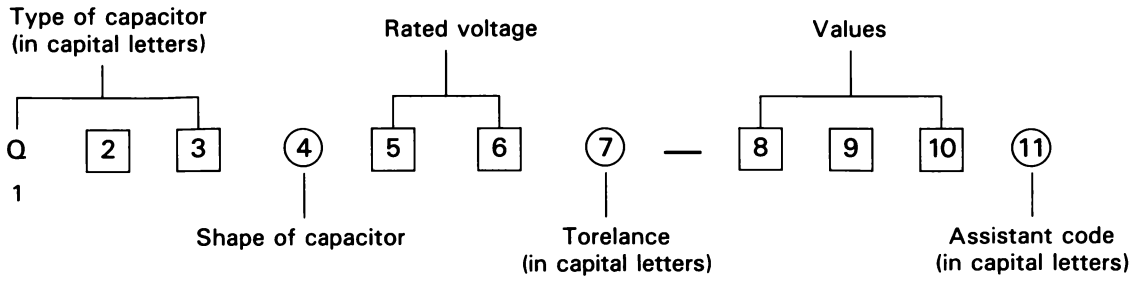
Shape of resistor (sixth digit)

Note: ■ marks are flame retardant resistor.

Shape of resistor \ Type of resistor	C	D	F	G	H	M	S	V	W	X
1										
2										
3										
4										
5									(L) type	
6										
7			Lug (B) type							
8			Lug (A) type				Chip			
9			Lug (C) type							

6.1.2 Fixed capacitor coding

Fixed capacitor part numbers are as follows.



Ceramic capacitors

Type of capacitor (first — third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Mono-direction	Kink lead	Axial lead	Axial forming lead	Chip
QCC	Ceramic	1		4	5	
QCD	High capacitance					A
QCF	High capacitance	1,4	3			8,A
QCS	Temperature compensation	1	3	4	5	8,A
QCT	Temperature compensation	Special coding				8,A
QCV	Ceramic			1	3	
QCX	Ceramic			1	3	
QCY	High capacitance	1,4	3	6	7	8,A
QCZ	Special type	Special coding				

Electrolytic capacitors

Type of capacitor (first-third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEB	Low leakage		4	5	6	
QEC	Low leakage		4,8,A	9,B	6,C	
QEE	Tantalum (normal)		4	5	6	
	Tantalum (small)		8			
QEF	Chip tantalum	8 (chip type)				
QEG	Low impedance		4			
QEK	Miniature type		4	5	6	
QEL	Small type		4	5	6	7
QEM	Small type		4	5	6	
QEN	Non-polar	2	4	5	6	
QEP	Non-polar (small)		4,A	5,B	6,C	
QER	Miniature type		4	5	6	
QET	Small type	2	4	5,B	6,C	7
QEU	Small type		4	5	6	
QEV	Small type		4		6	7
QEW	Normal	2	4	5	6	7

Paper film capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
		Tubular	Normal		Flame retardant	
Symbol	Characteristics		Mono-direction	Kink lead	Mono-direction	Kink lead
QFA	Metalized polypropylene				7	
QFE	Metalized mylar				5	
QFF	Film mica		4			
QFG	Polypropylene film		4	8		
QFH	Metalized mylar	2	4	3	5,7	6
QFJ	Mylar (special)		4			
QFK	Metalized mylar (small)				5	
QFM	Mylar	2	4	3,7	5	6
QFN	Mylar (small)		4	3		
QFP	Polypropylene		4	3,8		
QFS	Polystyrole	2	4	3		
QFV	Thin film		4	8		
QFZ	Special type	Special coding				

Rated voltage (fifth and sixth digits)

Fifth digit \ Sixth digit	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15	4.0		6.3				
1	10		16	20	25		40	50	63	80	35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

Tolerance (seventh digit)

A	$^{+100}_{-10}$ %	M	±20 %
F	±1 %	N	±30 %
G	±2 %	P	$^{+100}_{-0}$ %
H	$^{+50}_{-10}$ %	R	$^{+30}_{-10}$ %
J	±5 %	X	$^{+40}_{-20}$ %
K	±10 %	Z	$^{+80}_{-20}$ %

Values (eighth – tenth digits)

Example : Values are in picofarads

101	10×10^1 pF	100 pF
102	10×10^2 pF	1,000 pF (0.001 μF)
103	10×10^3 pF	10,000 pF (0.01 μF)
104	10×10^4 pF	100,000 pF (0.1 μF)
105	10×10^5 pF	1 μF
5R0		5.0 pF

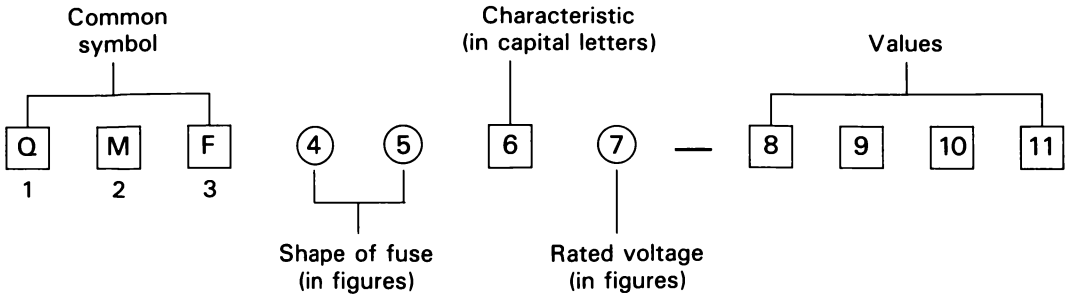
Assistant code (eleventh digit)

G Small size

Z Lead taping

6.1.3 Fuse coding

Standard fuse part numbers are as follows.



Shape of fuse
(fourth and fifth digits)

51	ϕ5.2×20 mm
60	ϕ6.4×30 mm
61	ϕ6.35×31.8 mm
63	ϕ6.4×30 mm with lead wires
66	ϕ6.35×31.8 mm with lead wires
00	Special type

Rated voltage
(seventh digit)

1	AC125 V
2	AC250 V
3	0.1—1 A : AC250 V 1.25—6.3 A : AC125 V

Values
(eighth-tenth or eleventh digits)
example:

R63	0.63 A
1R0	1.0 A
2R5	2.5 A
100	10 A
R315	0.315 A
1R25	1.25 A

Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 – 2 sec.	
	400 %	0.01 – 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % – 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % – 2000 %	Within 0.01 sec.	

6.2 ELECTRICAL PARTS LIST BY ASSEMBLIES

6.2.1 Power transformer assembly [01]

..... ⚠ PU57687A

Symbol No.	Part No.	Part Name	Description
⚠	PU35250-1-1	Power Trans Board	
⚠ C1	QFE52EM-223M	MM Cap	
⚠ PT1	PU57221	Power Transformer	
⚠ S1	QSE1135-007	Seesaw Switch	
⚠	PQ40414-3-2	Bracket	Seesaw SW
⚠	PU51212	Fuse Clip	for F1 x2
⚠	A74316	Tab	x2
⚠	QMP3960-200A	Power Cord Ass'y	
⚠	PU54983	Test Pin	TP1, 2
⚠	PU50479	Seesaw SW Cover	
⚠	PU35459	Insulator	POWER TRANS
⚠	SDSP3008Z	Screw	x2 Seesaw SW
⚠ F1	QMF51E2-1R0	Fuse	Not included in circuit board ass'y

NOTE: "x2" indicates two pieces.

6.2.2 Regulator board assembly [02]

..... PU21932A-3

Symbol No.	Part No.	Part Name	Description
Q1	2SD1590K,L	Transistor	
Q2	2SD1590K,L	Transistor	
Q3	2SC3070	Transistor	
Q4	–	–	
Q5	2SD1407O,Y	Transistor	
Q6	2SD637R,S	Transistor	
Q7	2SD637R,S	Transistor	
Q8	2SD1407O,Y	Transistor	
Q9	2SD637R,S	Transistor	
Q10	2SD637R,S	Transistor	
⚠ Q11	2SB744P,Q	Transistor	
D1	30D2	Diode	
D2	10E2	Diode	
D3	30D2	Diode	
D4	10E2	Diode	
D5	HZ15-2	Zener Diode	
D6	–	–	
D7	20E2	Diode	
D8	20E2	Diode	
D9	HZ12C1	Zener Diode	
D10	11E2	Diode	
D11	RD13EB2	Zener Diode	
D12	11E2	Diode	
D13	HZ6C2	Zener Diode	
D14	10E2	Diode	
D15	10E2	Diode	
D16	10E2	Diode	
D17	10E2	Diode	
D18	11E2	Diode	
D19	11E2	Diode	
D20	HZ30-3	Zener Diode	
⚠ D21	RD11EB1	Zener Diode	or RD11EN1, UZ11BL
⚠ D22	MA27WA	Diode	
D23	1SS133	Diode	
R1	QRG019J-152S	OMR	
⚠ R2	QRD181J-561	CR	
R3	QRG019J-152S	OMR	
R4	QRD181J-561	CR	
R5	QRD181J-102	CR	
R6	QRD181J-103	CR	
R7	QRD181J-332	CR	
R8	QRD181J-102	CR	
R9	QRD181J-332	CR	
R10	QVZ3244-472	VR	9V ADJ
R11	QRD181J-153	CR	
R12	QRD181J-331	CR	
R13	QRD181J-561	CR	
R14	QRD181J-151	CR	
R15	QRD181J-102	CR	
R16	QRD181J-123	CR	
R17	QVZ3244-103	VR	6V ADJ
R18	QRD181J-123	CR	
⚠ R19	QRG019J-272S	OMR	
C1	QFK52AK-473	MM Cap	
C2	–	–	
C3	–	–	

Symbol No.	Part No.	Part Name	Description
C4	QEU51VM-108	E Cap	
C5	QET61EM-476	E Cap	
C6	–	–	
C7	QCS31HJ-470	C Cap	
C8	QET61EM-107	E Cap	
C9	–	–	
C10	QEU51VM-228	E Cap	
C11	QET61EM-476	E Cap	
C12	QCS31HJ-470	C Cap	
C13	–	–	
C14	QET61EM-107	E Cap	
C15	–	–	
C16	QFN31HJ-334	MY Cap	
C17	QFN31HJ-103	MY Cap	
C18	QCS31HJ-470	C Cap	
C19	QET61EM-107	E Cap	
C20	QCF32HP-103	C Cap	
C21	–	–	
C22	–	–	
C23	QEU51CM-228	E Cap	
C24	–	–	
C25	QFN31HJ-103	MY Cap	
C26	QET61AM-227	E Cap	
C27	QCF32HP-103	C Cap	
C28	QET41JM-477	E Cap	
C29	QET61JM-227	E Cap	
C30	QCS31HJ-470	C Cap	
C31	QET61HM-226	E Cap	
C32	QEU51VM-228	E Cap	
CN1	PU50597-4	Cap Housing	
CN2	PU49215-108	Cap Housing	
CN3	PU49215-103	Cap Housing	
CN4	–	–	
CN5	PU49215-103	Cap Housing	
CN6	–	–	
CN7	PU43351-2	Cap Housing	
	PU54983	Test Pin	TP1–3
⚠	PU21953	Heat Sink	
	DPSP3008Z	Screw	x8, Q1,2,5,8, Heat Sink
⚠	PU51212	Fuse Clip	F3–F5 x6
	PU57758	Bush	Heat Sink
	PU52913-2	Spacer	8 ϕ
⚠ F3	QMF51E2-2R5	Fuse	Not included in circuit board ass'y
⚠ F4	QMF51E2-R80	Fuse	
⚠ F5	QMF51E2-R315	Fuse	

NOTE: "x6" indicates six pieces.

6.2.3 Video board assembly [03] PU11025D-2
–Luminance (Y) section–

Symbol No.	Part No.	Part Name	Description
IC1	–	–	
IC2	5VT09	Integrated Circuit	
IC3	–	–	
IC4	AN6393	Integrated Circuit	
IC5	AN6327	Integrated Circuit	
IC6	AN6392	Integrated Circuit	
IC7	AN6306	Integrated Circuit	
IC8	T8004	Integrated Circuit	
IC9	TL8704P	Integrated Circuit	
IC10	BA7024	Integrated Circuit	
IC11	BA7021	Integrated Circuit	
Q1	2SC2021Q,R,S	Transistor	
Q2	2SC2021Q,R,S	Transistor	
Q3	2SC2021Q,R,S	Transistor	
Q4	–	–	
Q5	2SB641Q	Transistor	
Q6	2SC2021Q,R,S	Transistor	
Q7	2SC2021Q,R,S	Transistor	
Q8	DTC114F	D Transistor	
Q9	DTC114F	D Transistor	
Q10	2SC2021Q,R,S	Transistor	
Q11	2SB641Q	Transistor	
Q12	2SK381C	FET	
Q13	2SC2021Q,R,S	Transistor	
Q14	2SB641Q	Transistor	
Q15	2SB641Q	Transistor	
Q16	2SC2021Q,R,S	Transistor	
Q17	2SC2021Q,R,S	Transistor	
Q18	–	–	
Q19	–	–	
Q20	2SC2021Q,R,S	Transistor	
Q21	2SC2021Q,R,S	Transistor	
Q22	2SC2021Q,R,S	Transistor	
Q23	DTC114F	D Transistor	
Q24	DTC114F	D Transistor	
Q25	2SB641Q	Transistor	
Q26	2SB641Q	Transistor	
Q27	2SC2021Q,R,S	Transistor	
Q28	2SB641Q	Transistor	
Q29	2SC2021Q,R,S	Transistor	
Q30	2SC2021Q,R,S	Transistor	
Q31	2SB641Q	Transistor	
Q35	2SC2021Q,R,S	Transistor	
Q36	DTC114F	D Transistor	
Q37	2SC2021Q,R,S	Transistor	
Q38	2SB641Q	Transistor	
Q39	2SB641Q	Transistor	
⚠ Q40	2SB810J	Transistor	
⚠ Q41	2SB810J	Transistor	
Q42	DTA114F	D Transistor	
Q43	2SB641Q	Transistor	
Q44	2SC2021Q,R,S	Transistor	
⚠ Q45	2SA564Q	Transistor	
Q46	2SB643R	Transistor	
Q47	2SC2021Q,R,S	Transistor	
Q48	–	–	
Q49	DTC114F	D Transistor	

(Video Y)

Symbol No.	Part No.	Part Name	Description
Q54	DTC114F	D Transistor	
Q55	DTC114F	D Transistor	
D11	1SS133	Diode	
D12	1SS133	Diode	
D13	–	–	
D14	–	–	
⚠ D15	HZ3CLL	Zener Diode	
D16	1SS99	Diode	
D17	1SS133	Diode	
D18	–	–	
D19	1SS133	Diode	
D20	–	–	
D21	–	–	
D22	1SS133	Diode	
D23	OA90	Diode	
D24	1SS133	Diode	
D25	1SS133	Diode	
D26	1SS133	Diode	
D27	1SS133	Diode	
D28	1SS133	Diode	
D29	1SS133	Diode	
D30	1SS133	Diode	
D31	1SS133	Diode	
D32	1SS133	Diode	
D33	1SS133	Diode	
D34	–	–	
D35	–	–	
D36	1SS133	Diode	
D37	–	–	
D38	1SS133	Diode	
D39	1SS133	Diode	
D40	1SS133	Diode	
D41	1SS133	Diode	
⚠ CP1	ICP-F10	Circuit Protector	0.4A
R1	–	–	
R2	–	–	
R3	QRD161J-102	CR	
R4	QRD161J-102	CR	
R5	QRD161J-473	CR	
R6	QRD161J-332	CR	
R7	QRD161J-471	CR	
R8	QRD161J-103	CR	
R9	QRD161J-102	CR	
R10	QRD161J-102	CR	
R11	–	–	
R12	–	–	
R13	QRD161J-272	CR	
R14	–	–	
R15	QRD161J-102	CR	
R16	QRD161J-102	CR	
R17	QRD161J-223	CR	
R18	QRD161J-223	CR	
R19	QRD161J-102	CR	
R20	QRD161J-102	CR	

Symbol No.	Part No.	Part Name	Description
R21	QRD161J-181	CR	
R22	QRD161J-122	CR	
R23	QRD161J-182	CR	
R24	QRD161J-152	CR	
R25	QRD161J-102	CR	
R26	QRD161J-102	CR	
R27	QRD161J-102	CR	
R28	QRD161J-821	CR	
R29	QVZ3518-222	VR	SP PB EQ
R30	QRD161J-103	CR	
R31	QRD161J-103	CR	
R32	QRD161J-122	CR	
R33	QRD161J-392	CR	
R34	QRD161J-122	CR	
R35	QRD161J-223	CR	
R36	QRD161J-223	CR	
R37	QRD161J-391	CR	
R38	QRD161J-152	CR	
R39	QRD161J-391	CR	
R40	QRD161J-102	CR	
R41	QRD161J-471	CR	
R42	QRD161J-331	CR	
R43	QVZ3514-473	VR	SHARPNESS PRE
R44	QRD161J-153	CR	
R45	QRD161J-103	CR	
R46	QRD161J-332	CR	
R47	QRD161J-222	CR	
R48	QRD161J-182	CR	
R49	QRD161J-471	CR	
R50	QRD161J-222	CR	
R51	QRD161J-222	CR	
R52	QRD161J-222	CR	
R53	QRD161J-183	CR	
R54	QRD161J-684	CR	
R55	QRD161J-564	CR	
R56	QRD161J-154	CR	
R57	QRD161J-122	CR	
R58	QRD161J-102	CR	
R59	QVZ3518-102	VR	PB COLOUR
R60	QRD161J-222	CR	
R61	QRD161J-122	CR	
R62	QRD161J-103	CR	
R63	QRD161J-822	CR	
R64	QRD161J-332	CR	
R65	QRD161J-331	CR	
R66	QRD161J-393	CR	
R67	QRD161J-152	CR	
R68	QRD161J-820	CR	
R69	QRD161J-121	CR	
R70	QRD161J-222	CR	
R71	QVZ3514-102	VR	SP REC COLOUR
R72	QRD161J-151	CR	
R73	QRD161J-331	CR	
R74	–	–	
R75	QVZ3514-102	VR	LP REC COLOUR
R76	QRD161J-223	CR	
R77	QRD161J-223	CR	
R78	–	–	
R79	QRD161J-152	CR	
R80	QRD161J-222	CR	
R81	QRD161J-222	CR	

Symbol No.	Part No.	Part Name	Description
R82	QVZ3518-471	VR	LP REC FM
R87	QRD161J-223	CR	
R88	QRD161J-181	CR	
R89	QRD161J-103	CR	
R90	QRD161J-223	CR	
R91	QRD161J-153	CR	
R92	QRD161J-271	CR	
R93	QRD161J-821	CR	
R94	–	–	
R95	QRD161J-563	CR	
R96	QRD161J-393	CR	
R97	QRD161J-470	CR	
R98	QRD161J-822	CR	
R99	QRD161J-103	CR	
R100	QVZ3514-103	VR	DARK CLIP
R101	QRD161J-103	CR	
R102	QVZ3514-103	VR	CARRIER
R103	QRD161J-102	CR	
R104	QRD161J-152	CR	
R105	QVZ3514-682	VR	DEVIATION
R106	QRD161J-272	CR	
R107	QRD161J-822	CR	
R108	QVZ3514-103	VR	WHITE CLIP
R109	QRD161J-682	CR	
R110	QRD161J-152	CR	
R111	QRD161J-682	CR	
R112	QRD161J-332	CR	
R113	QRD161J-222	CR	
R114	QRD161J-221	CR	
R115	QRD161J-563	CR	
R116	QRD161J-181	CR	
R117	QRD161J-272	CR	
R118	QRD161J-152	CR	
R119	QRD161J-562	CR	
R120	QRD161J-331	CR	
R121	–	–	
R122	QRD161J-152	CR	
R123	QVZ3514-103	VR	EE VIDEO LEVEL
R124	QRD161J-391	CR	
R125	QRD161J-561	CR	
R126	QRD161J-222	CR	
R127	QRD161J-224	CR	
R128	QRD161J-332	CR	
R129	QRD161J-222	CR	
R130	QRD161J-332	CR	
R131	QRD161J-393	CR	
R132	QRD161J-152	CR	
R133	QRD161J-183	CR	
R134	QRD161J-102	CR	
R135	QVZ3514-102	VR	PB Y
R136	QRD161J-222	CR	
R137	QRD161J-102	CR	
R138	QRD161J-102	CR	
R139	QRD161J-102	CR	
R140	QVZ3518-102	VR	NOISE BALANCE
R141	QRD161J-473	CR	
R142	QRD161J-183	CR	
R143	QRD161J-222	CR	
R144	–	–	

Symbol No.	Part No.	Part Name	Description
R145	QRD161J-223	CR	
R146	QRD161J-103	CR	
R151	QRD161J-182	CR	
R152	QRD161J-392	CR	
R153	QRD161J-821	CR	
R154	QRD161J-102	CR	
R155	QRD161J-272	CR	
R156	QRD161J-222	CR	
R157	QRD161J-684	CR	
R158	QRD161J-102	CR	
R159	QRD161J-103	CR	
R160	QRD161J-182	CR	
R161	QRD161J-331	CR	
R162	QRD161J-393	CR	
R163	QRD161J-102	CR	
R164	QRD161J-103	CR	
R165	–	–	
R166	QRD161J-473	CR	
R167	QRD161J-393	CR	
R168	QRD161J-561	CR	
R169	QRD161J-471	CR	
R170	QRD161J-102	CR	
R171	QRD161J-102	CR	
R172	QRD161J-471	CR	
R173	QRD161J-750	CR	
R174	QRD161J-563	CR	
⚠ R175	QRD161J-821	CR	
R176	QRD161J-563	CR	
R177	QRD161J-272	CR	
R178	QRD161J-393	CR	
R179	QRD161J-472	CR	
R180	–	–	
R181	QRD161J-123	CR	
R182	QRD161J-272	CR	
R183	QRD161J-393	CR	
⚠ R184	QRD161J-391	CR	
R185	QRD161J-393	CR	
⚠ R186	QRD161J-472	CR	
R187	QRD161J-392	CR	
R188	QRD161J-123	CR	
R189	QRD161J-272	CR	
R190	QRD161J-223	CR	
R191	–	–	
R192	QRD181J-103	CR	
R202	QRD161J-682	CR	
R203	QRD161J-183	CR	
R211	QRD161J-331	CR	
R212	QRD161J-563	CR	
R213	QRD161J-821	CR	
R214	QRD161J-222	CR	
R215	–	–	
R216	QRD161J-105	CR	
R217	QRD181J-475	CR	
R218	QRD161J-102	CR	
R219	QRD161J-123	CR	
R220	QRD161J-103	CR	

(Video Y)

Symbol No.	Part No.	Part Name	Description
R221	QRD161J-122	CR	
R222	QRD161J-222	CR	
R701	QRD161J-392	CR	
C5	QCF31HP-223	C Cap	
C6	QFN31HJ-682	MY Cap	
C7	QEK60JM-336	E Cap	
C8	QCF31HP-223	C Cap	
C9	QCF31HP-223	C Cap	
C10	QFN31HJ-473	MY Cap	
C11	QCS31HJ-470	C Cap	
C12	QCF31HP-223	C Cap	
C13	QCF31HP-223	C Cap	
C14	QCF31HP-103	C Cap	
C15	QET60JM-336	E Cap	
C16	QCF31HP-223	C Cap	
C20	QCS31HJ-471	C Cap	
C21	QCS31HJ-101	C Cap	
C22	QCF31HP-103	C Cap	
C23	QCS31HJ-680	C Cap	
C24	QCS31HJ-270	C Cap	
C25	QCS31HJ-270	C Cap	
C26	QET60JM-336	E Cap	
C27	QCS31HJ-470	C Cap	
C28	QCF31HP-223	C Cap	
C29	QCF31HP-103	C Cap	
C30	QCF31HP-103	C Cap	
C31	QET60JM-336	E Cap	
C32	QCS41HJ-560	C Cap	
C33	QCX11EM-153	C Cap	
C34	QFN31HJ-223	MY Cap	
C35	QCX11EM-103	C Cap	
C36	QCX11EM-103	C Cap	
C37	QET60JM-336	E Cap	
C38	QCF31HP-223	C Cap	
C39	QCX11EM-153	C Cap	
C40	QCS31HJ-470	C Cap	
C41	QCX11EM-153	C Cap	
C42	QCS41HJ-330	C Cap	
C43	QCF31HP-103	C Cap	
C44	QCF31HP-103	C Cap	
C45	QCS31HJ-220	C Cap	
C46	QET60JM-476	E Cap	
C47	QET60JM-476	E Cap	
C48	QCS41HJ-680	C Cap	
C49	QCF31HP-223	C Cap	
C50	QCY61HJ-331	C Cap	
C51	QCS31HJ-181	C Cap	
C52	–	–	
C53	QCF31HP-223	C Cap	
C54	QCX11EM-153	C Cap	
C55	QCS31HJ-820	C Cap	
C56	QCY61HJ-221	C Cap	
C57	QCS31HJ-270	C Cap	
C58	QCS31HJ-121	C Cap	
C59	QFN31HJ-222	MY Cap	
C60	QET61EM-475	E Cap	

Symbol No.	Part No.	Part Name	Description
C61	QCF31HP-222	C Cap	
C62	QET61CM-106	E Cap	
C63	QCF31HP-102	C Cap	
C64	QCY61HJ-561	C Cap	
C65	QCF31HP-103	C Cap	
C66	QET61HM-105	E Cap	
C67	QCY61HJ-151	C Cap	
C68	QCS41HJ-121	C Cap	
C69	QCF31HP-103	C Cap	
C70	QET61HM-105	E Cap	
C71	QCS41HJ-820	C Cap	
C72	QET60JM-337	E Cap	
C73	QCT25CH-390	C Cap	
C74	QCF31HP-223	C Cap	
C75	QEK61AM-476	E Cap	
C76	QCF31HP-223	C Cap	
C77	QET61CM-106	E Cap	
C78	QCF31HP-103	C Cap	
C79	QEK61HM-105	E Cap	
C80	QCS31HJ-470	C Cap	
C81	QCF31HP-223	C Cap	
C82	QCF31HP-223	C Cap	
C83	QCF31HP-223	C Cap	
C84	QCF31HP-223	C Cap	
C85	QCF31HP-223	C Cap	
C86	QCF31HP-223	C Cap	
C87	QEK60JM-336	E Cap	
C88	QCF31HP-223	C Cap	
C89	QCF31HP-103	C Cap	
C90	QCF31HP-103	C Cap	
C91	QCS31HJ-121	C Cap	
C92	QCS41HJ-121	C Cap	
C93	QCF31HP-223	C Cap	
C94	QCF31HP-103	C Cap	
C95	PU51163-181	C Cap	180 pF
C96	QCT25CH-390	C Cap	39 pF/50 V
C97	QET60JM-107	E Cap	
C98	QCS31HJ-100	C Cap	
C99	QCF31HP-223	C Cap	
C100	QEN61CM-106	NP Cap	
C101	QCS31HJ-221	C Cap	
C102	QET61EM-475	E Cap	
C103	QCS31HJ-121	C Cap	
C104	PU51163-391	C Cap	390 pF
C105	QEK61HM-224	E Cap	
C106	QCS31HJ-331	C Cap	
C107	QCF31HP-103	C Cap	
C108	QET61HM-105	E Cap	
C109	QET61HM-335	E Cap	
C110	QET60JM-227	E Cap	
C111	QET61EM-475	E Cap	
C112	QET61CM-106	E Cap	
C113	QET61CM-106	E Cap	
C114	QET60JM-336	E Cap	
C115	QET60JM-476	E Cap	
C116	QCS31HJ-270	C Cap	
C117	QCS31HJ-820	C Cap	
C118	QET60JM-476	E Cap	
C119	QCS31HJ-270	C Cap	
C120	QCF31HP-223	C Cap	
C121	QET61CM-106	E Cap	

Symbol No.	Part No.	Part Name	Description
C122	QEK61HM-104	E Cap	
C123	QET61HM-474	E Cap	
C124	QCF31HP-103	C Cap	
C125	QFN31HJ-104	MY Cap	
C126	QET61HM-105	E Cap	
C133	QET60JM-476	E Cap	
C134	PU51163-271	C Cap	270 pF
C135	QCF31HP-223	C Cap	
C136	QCS31HJ-180	C Cap	
C137	QCS31HJ-680	C Cap	
C138	–	–	
C139	QCS31HJ-181	C Cap	
C140	QEN61AM-336	NP Cap	
C141	QCS31HJ-560	C Cap	
C142	–	–	
C143	QCS31HJ-390	C Cap	
C144	QCS31HJ-8R0	C Cap	
C145	QCS31HJ-560	C Cap	
C146	QET61AM-476	E Cap	
C147	QCF31HP-223	C Cap	
C148	QET61HM-105	E Cap	
C149	QCF31HP-223	C Cap	
C150	QET61HM-105	E Cap	
C151	QET61CM-106	E Cap	
C152	QCF31HP-223	C Cap	
C153	QCF31HP-223	C Cap	
C154	QCF31HP-223	C Cap	
C155	QET60JM-476	E Cap	
C156	QCF31HP-223	C Cap	
C157	QCS31HJ-561	C Cap	
C158	QCS31HJ-101	C Cap	
C159	QEK40JM-476	E Cap	
C160	QET61HM-105	E Cap	
C161	QET61AM-107	E Cap	
C162	QCF31HP-223	C Cap	
C163	QET60JM-108	E Cap	
C164	QCS31HJ-8R0	C Cap	
C165	QET61HM-105	E Cap	
C166	QET60JM-336	E Cap	
C167	QCF31HP-223	C Cap	
C183	QET61AM-336	E Cap	
C187	QET60JM-107	E Cap	
C188	QCS31HJ-7R0	C Cap	
C189	QCS31HJ-100	C Cap	
C190	QCX11EM-153	C Cap	
C191	QCS11HJ-750	C Cap	
C192	QCS31HJ-181	C Cap	
C193	QCS31HJ-220	C Cap	
C194	QFN31HJ-563	MY Cap	
C195	QCS31HJ-820	C Cap	
L4	PU48530-821J	Peaking Coil	820 μH
L5	PU48530-222J	Peaking Coil	2.2 μH
L6	PU48530-271J	Peaking Coil	270 μH
L7	PU48530-101K	Peaking Coil	100 μH

Symbol No.	Part No.	Part Name	Description
L8	PU48530-101K	Peaking Coil	100 μH
L9	–	–	
L10	PU48530-151J	Peaking Coil	150 μH
L11	PU48530-470J	Peaking Coil	47 μH
L12	PU48530-120J	Peaking Coil	12 μH
L13	PU48530-180J	Peaking Coil	18 μH
L14	PU48530-101J	Peaking Coil	100 μH
L15	PU48530-101K	Peaking Coil	100 μH
L16	PU48530-180J	Peaking Coil	18 μH
L17	PU48530-101K	Peaking Coil	100 μH
L18	PU48530-101K	Peaking Coil	100 μH
L19	PU48530-180J	Peaking Coil	18 μH
L20	PU48530-331J	Peaking Coil	330 μH
L21	PU48530-121J	Peaking Coil	120 μH
L22	PU48530-8R2K	Peaking Coil	8.2 μH
L23	PU48530-101K	Peaking Coil	100 μH
L24	PU48530-101K	Peaking Coil	100 μH
L25	PU48530-101K	Peaking Coil	100 μH
L26	PU48530-100J	Peaking Coil	10 μH
L27	PU48530-101K	Peaking Coil	100 μH
L28	PU48530-221J	Peaking Coil	220 μH
L29	PU48530-680J	Peaking Coil	68 μH
L30	PU48530-181J	Peaking Coil	180 μH
L31	PU48530-101J	Peaking Coil	100 μH
L32	PU48530-101K	Peaking Coil	100 μH
L33	PU48530-680J	Peaking Coil	68 μH
L34	PU48530-680J	Peaking Coil	68 μH
L35	PU48530-101K	Peaking Coil	100 μH
L36	–	–	
L37	–	–	
L38	PU48530-101K	Peaking Coil	100 μH
L39	PU48530-391J	Peaking Coil	390 μH
L40	PU48530-470J	Peaking Coil	47 μH
L41	PU48530-390J	Peaking Coil	39 μH
L42	PU48530-270J	Peaking Coil	27 μH
L43	PU48530-470J	Peaking Coil	47 μH
L44	PU48530-101K	Peaking Coil	100 μH
⚠ L45	PU53223-270J	Peaking Coil	27 μH
L46	PU48530-101K	Peaking Coil	100 μH
L47	PU48530-101K	Peaking Coil	100 μH
⚠ CF1	PU55549	Ceramic Filter	500 kHz
LPF1	PU54408-2	Low Pass Filter	
LPF2	PU57122	Low Pass Filter	
EQ1	PU53228	Equalizer	
EQ2	PU57219	Equalizer	
EQ3	PU54838	Equalizer	
CN4	PU49215-4	Cap Housing	
CN5	PU49215-2	Cap Housing	
CN6	PU49215-2R	Cap Housing	
CN7	PU49215-2	Cap Housing	
CN10	PU49215-3R	Cap Housing	
CN11	PU49215-4R	Cap Housing	
CN12	PU49215-2Y	Cap Housing	
CN13	PU49215-8	Cap Housing	
	PU50766	Test Pin	TP3,4,6,10–12, 21–24,26,27 GND

—Video colour section—

Symbol No.	Part No.	Part Name	Description
IC401	HA11756	Integrated Circuit	
IC402	BA7007	Integrated Circuit	
IC403	BA7021	Integrated Circuit	
IC404	TL8705P	Integrated Circuit	
IC405	AN3592K	Integrated Circuit	
Q401	2SC2021S	Transistor	
Q402	2SC2021S	Transistor	
Q403	2SC2636R	Transistor	
Q404	2SC2021S	Transistor	
Q405	—	—	
Q406	2SC2021Q,R	Transistor	
Q407	2SC2021Q,R	Transistor	
Q408	2SC2021Q,R	Transistor	
Q409	DTC114F	D Transistor	
Q410	2SC2021Q,R	Transistor	
Q411	DTC144F	D Transistor	
Q412	DTC144F	D Transistor	
Q413	DTC144F	D Transistor	
Q414	DTC144F	D Transistor	
Q415	DTC144F	D Transistor	
Q416	2SC2021Q,R	Transistor	
Q417	DTC144F	D Transistor	
Q418	2SC2647B,C	Transistor	
Q419	2SC2636R	Transistor	
Q420	2SC2636R	Transistor	
Q421	2SC2647B,C	Transistor	
Q422	2SC2647B,C	Transistor	
Q423	2SC2647B,C	Transistor	
Q424	DTC144F	D Transistor	
Q425	2SC2021Q,R	Transistor	
Q426	2SC2021Q,R	Transistor	
Q427	2SB641Q,R	Transistor	
Q428	2SC2021Q,R	Transistor	
Q429	2SC2021Q,R	Transistor	
Q430	2SC2021Q,R	Transistor	
Q431	2SC2021Q,R	Transistor	
Q432	2SC2021Q,R	Transistor	
Q433	DTC144F	D Transistor	
Q434	DTC144F	D Transistor	
Q435	2SC2655O,Y	Transistor	
Q436	DTC144F	D Transistor	
D401	1SS133	Diode	
D402	1SS133	Diode	
D403	1SS133	Diode	
D404	1SS133	Diode	
D405	1SS133	Diode	
D406	1SS133	Diode	
D407	1SS133	Diode	
D408	1SS133	Diode	
D409	1SS133	Diode	
D410	1SS133	Diode	
D411	1SS133	Diode	
D412	1SS133	Diode	
D413	1SS133	Diode	
D414	1SS133	Diode	
D415	1SS133	Diode	
D416	1SS133	Diode	
D417	1SS133	Diode	
D418	1SS133	Diode	

Symbol No.	Part No.	Part Name	Description
D419	1SS133	Diode	
D420	1SS133	Diode	
D421	1SS133	Diode	
D422	1SS133	Diode	
D423	1SS133	Diode	
⚠ CP401	ICP-F10	Circuit Protector	0.4A
R401	QRD161J-223	CR	
R402	QRD161J-223	CR	
R403	QRD161J-680	CR	
R404	QRD161J-390	CR	
R405	QRD161J-333	CR	
R406	QRD161J-123	CR	
R407	QRD161J-222	CR	
R408	QRD161J-471	CR	
R409	QRD161J-473	CR	
R410	QRD161J-183	CR	
R411	QRD161J-122	CR	
R412	QRD161J-471	CR	
R413	QRD161J-820	CR	
R414	QRD161J-121	CR	
R415	QRD161J-681	CR	
R416	QRD161J-102	CR	
R417	QRD161J-102	CR	
R418	QRD161J-332	CR	
R419	QRD161J-332	CR	
R420	QRD161J-393	CR	
R421	QRD161J-102	CR	
R422	QRD161J-102	CR	
R423	QRD161J-103	CR	
R424	QRD161J-104	CR	
R425	QRD161J-102	CR	
R426	QRD161J-153	CR	
R427	QRD161J-122	CR	
R428	QRD161J-122	CR	
R429	QRD161J-152	CR	
R430	QRD161J-473	CR	
R431	QRD161J-221	CR	
R432	QRD161J-103	CR	
R433	QRD161J-102	CR	
R434	QRD161J-183	CR	
R435	QRD161J-683	CR	
R436	QRD161J-182	CR	
R437	QVZ3514-102	VR	SECAM DET
R438	QRD161J-103	CR	
R439	QRD161J-333	CR	
R440	QRD161J-103	CR	
R441	QRD161J-562	CR	
R442	—	—	
R443	QRD161J-103	CR	
R444	QRD161J-333	CR	
R445	QRD161J-183	CR	
R446	QRD161J-682	CR	
R447	QRD161J-562	CR	
R448	QRD161J-152	CR	
R449	QRD161J-472	CR	
R450	QRD161J-102	CR	

Symbol No.	Part No.	Part Name	Description
R451	QRD161J-223	CR	
R452	QRD161J-472	CR	
R453	QRD161J-222	CR	
R454	QRD161J-222	CR	
R455	QRD161J-123	CR	
R456	QRD161J-123	CR	
R457	QRD161J-473	CR	
R458	QRD161J-274	CR	
R459	QVZ3514-223	VR	CONV BAL
R460	QRD161J-103	CR	
R461	QVZ3514-223	VR	VXO
R462	QRD161J-274	CR	
R463	QRD161J-472	CR	
R464	QRD161J-332	CR	
R465	QVZ3514-103	VR	AFC
R466	QRD161J-681	CR	
R467	QRD161J-102	CR	
R468	QRD161J-102	CR	
R469	QRD161J-473	CR	
R470	QRD161J-472	CR	
R471	QRD161J-103	CR	
R472	QRD161J-473	CR	
R473	QRD161J-473	CR	
R474	QRD161J-222	CR	
R475	QRD161J-223	CR	
R476	QRD161J-682	CR	
R477	QRD161J-152	CR	
R478	QRD161J-102	CR	
R479	QRD161J-333	CR	
R480	QRD161J-153	CR	
R481	QRD161J-561	CR	
R482	QRD161J-221	CR	
R483	QRD161J-331	CR	
R484	QRD161J-473	CR	
R485	QRD161J-473	CR	
R486	QRD161J-471	CR	
R487	QRD161J-471	CR	
R488	QRD161J-393	CR	
R489	QRD161J-223	CR	
R490	QRD161J-561	CR	
R491	QRD161J-561	CR	
R492	QRD161J-222	CR	
R493	QRD161J-822	CR	
R494	QRD161J-103	CR	
R495	QRD161J-152	CR	
R496	QVZ3514-103	VR	0.5H DELAY
R497	QRD161J-473	CR	
R498	QRD161J-393	CR	
R499	QRD161J-222	CR	
R500	QRD161J-103	CR	
R501	QRD161J-102	CR	
R502	QRD161J-122	CR	
R503	QRD161J-682	CR	
R504	QRD161J-223	CR	
R505	QRD161J-471	CR	
R506	QRD161J-681	CR	
R507	QRD161J-681	CR	
R508	QRD161J-331	CR	
R509	QRD161J-221	CR	
R510	QRD161J-222	CR	
R511	QRD161J-103	CR	

Symbol No.	Part No.	Part Name	Description
R512	QRD161J-103	CR	
R513	QRD161J-391	CR	
R514	QRD161J-123	CR	
R515	QRD161J-104	CR	
R517	QRD161J-473	CR	
R518	QRD161J-473	CR	
R519	QRD161J-473	CR	
R520	QRD161J-821	CR	
R521	QRD161J-272	CR	
R522	QRD161J-222	CR	
R523	QVZ3514-222	VR	INVERTED COL
R524	QRD161J-393	CR	
R525	QVZ3514-473	VR	0.5H DET
R526	QRD161J-221	CR	
R527	QRD161J-154	CR	
R528	QRD161J-103	CR	
R529	QRD161J-223	CR	
R530	–	–	
R531	QRD161J-102	CR	
R532	QRD161J-154	CR	
R533	–	–	
R534	QRD161J-682	CR	
R535	QRD161J-562	CR	
R536	QRD161J-151	CR	
R537	QRD161J-223	CR	
R538	QRD161J-154	CR	
R539	–	–	
R540	QRG016J-680	OMR	
R541	–	–	
R542	QRD161J-272	CR	
R543	QRD161J-104	CR	
C401	QCF31HP-223	C Cap	
C402	QET60JM-107	E Cap	
C403	QCF31HP-103	C Cap	
C404	QCF31HP-103	C Cap	
C405	QCS31HJ-221	C Cap	
C406	QCS31HJ-120	C Cap	
C407	QCF31HP-103	C Cap	
C408	QCF31HP-103	C Cap	
C409	–	–	
C410	QCF31HP-103	C Cap	
C411	QEE51VM-684	T Cap	
C412	QFN31HJ-102	MY Cap	
C413	QCS31HJ-101	C Cap	
C414	QFN31HJ-473	MY Cap	
C415	QET61EM-475	E Cap	
C416	QCF31HP-103	C Cap	
C417	QET61EM-475	E Cap	
C418	QCF31HP-223	C Cap	
C419	QCF31HP-103	C Cap	
C420	QCF31HP-223	C Cap	
C421	QCF31HP-223	C Cap	
C422	QET60JM-107	E Cap	
C423	QET61AM-226	E Cap	
C424	QCF31HP-223	C Cap	
C425	QCS31HJ-101	C Cap	
C426	QCF31HP-103	C Cap	
C427	QCF31HP-103	C Cap	

(Video colour)

Symbol No.	Part No.	Part Name	Description
C428	QCF31HP-223	C Cap	
C429	QCF31HP-223	C Cap	
C430	QET61HM-225	E Cap	
C431	–	–	
C432	–	–	
C433	QFN31HJ-472	MY Cap	
C434	QET60JM-107	E Cap	
C435	QCF31HP-223	C Cap	
C436	QFN31HJ-223	MY Cap	
C437	QET61HM-105	E Cap	
C438	QEE41AM-685	T Cap	
C439	QFN31HJ-683	MY Cap	
C440	QFN31HJ-563	MY Cap	
C441	QFN31HJ-333	MY Cap	
C442	QCT25CH-180	C Cap	18 pF/50 V
C443	QCT25CH-180	C Cap	18 pF/50 V
C444	QCX11EM-103	C Cap	
C445	QCS31HJ-470	C Cap	
C446	QET61AM-107	E Cap	
C447	QCF31HP-223	C Cap	
C448	QET61AM-476	E Cap	
C449	QCF31HP-223	C Cap	
C450	QET61AM-336	E Cap	
C451	–	–	
C452	QFN31HJ-182	MY Cap	
C453	QFN31HJ-272	MY Cap	
C454	QFN31HJ-104	MY Cap	
C455	QFN31HJ-103	MY Cap	
C456	QFN31HJ-473	MY Cap	
C457	QFT61CM-106	E Cap	
C458	QCF31HP-103	C Cap	
C464	QET60JM-107	E Cap	
C465	QCF31HP-223	C Cap	
C466	QCF31HP-103	C Cap	
C467	QCS31HJ-121	C Cap	
C468	QCS31HJ-101	C Cap	
C469	QCS31HJ-121	C Cap	
C470	QCS31HJ-151	C Cap	
C471	QET60JM-107	E Cap	
C472	QCF31HP-223	C Cap	
C473	QCS31HJ-560	C Cap	
C474	QCS31HJ-560	C Cap	
C475	QCF31HP-103	C Cap	
C476	QCS31HJ-680	C Cap	
C477	QCF31HP-103	C Cap	
C478	QCF11HP-223	C Cap	
C479	QCT61HM-104	E Cap	
C480	QET60JM-107	E Cap	
C481	QCF31HP-223	C Cap	
C482	QCX11EM-103	C Cap	
C483	QER41CM-106	E Cap	
C484	QER41HM-105	E Cap	
C485	QER41EM-475	E Cap	
C486	QCX11EM-103	C Cap	
C487	QCF11HP-103	C Cap	
C488	QET61CM-106	E Cap	
C489	QEK61HM-104	E Cap	
C490	QET61AM-107	E Cap	
C491	QCF31HP-223	C Cap	

Symbol No.	Part No.	Part Name	Description
C492	QCF31HP-223	C Cap	
C493	QET61AM-107	E Cap	
C494	QCS31HJ-270	C Cap	
C495	QET60JM-476	E Cap	
C496	QCS31HJ-820	C Cap	
C497	QFN31HJ-332	MY Cap	
C498	QFN31HJ-152	MY Cap	
C499	QET61EM-475	E Cap	
C500	–	–	
C501	QET61HM-105	E Cap	
C502	QET61HM-105	E Cap	
C503	QCF31HP-103	C Cap	
C504	QCF31HP-103	C Cap	
C505	QCS31HJ-220	C Cap	
C506	QCS31HJ-220	C Cap	
C507	QCF31HP-103	C Cap	
C508	QET61HM-105	E Cap	
C509	QFN31HJ-222	MY Cap	
C510	QFN31HJ-273	MY Cap	
C511	QFN31HJ-103	MY Cap	
C512	QFN31HJ-222	MY Cap	
C513	QCF31HP-223	C Cap	
C514	QET60JM-107	E Cap	
C515	QCF31HP-103	C Cap	
C516	QCX11EM-103	C Cap	
C517	QCF31HP-103	C Cap	
C518	QCS31HJ-470	C Cap	
C519	QCF31HP-223	C Cap	
C520	QET61HM-105	E Cap–	
C521	QET61HM-105	E Cap	
C522	QCS31HJ-220	C Cap	
C523	QCS31HJ-680	C Cap	
C524	QFN31HK-563	MY Cap	
C525	QFN31HK-222	MY Cap	
C526	QCF31HP-223	C Cap	
C527	QET61AM-227	E Cap	
C528	QCF11HP-222	C Cap	
C529	QET61HM-225	E Cap	
C530	–	–	
C531	QCF11HP-102	C Cap	
C701	QCF11HP-223	C Cap	
C702	QCF11HP-223	C Cap	
L401	PU48530-101K	Peaking Coil	100 μH
L402	PU48530-3R3K	Peaking Coil	3.3 μH
L403	PU48530-150J	Peaking Coil	15 μH
L404	PU48530-101K	Peaking Coil	100 μH
L405	PU48530-101K	Peaking Coil	100 μH
L406	PU30284-25R	Coil	25 μH
L407	PU49057	LC Block	7.813 kHz
L408	–	–	
L409	PU54710-822	Coil	8.2 mH
⚠ L410	PU48530-101K	Peaking Coil	100 μH
L411	PU48530-101K	Peaking Coil	100 μH
L412	PU48530-100J	Peaking Coil	10 μH
L413	PU48530-2R7K	Peaking Coil	2.7 μH
L414	PU48530-100J	Peaking Coil	10 μH
L415	PU48530-101K	Peaking Coil	100 μH

Symbol No.	Part No.	Part Name	Description
L416	PU48530-101K	Peaking Coil	100 μH
L417	PU48530-101K	Peaking Coil	100 μH
L418	PU48530-560J	Peaking Coil	56 μH
L419	PU53223-100J	Peaking Coil	10 μH
L420	PU49057	LC Block	7.813 kHz
L421	PU48530-330J	Peaking Coil	33 μH
⚠ L422	PU53618-330J	Peaking Coil	33 μH
L423	PU57139	LC Block	
⚠ X401	PU31449-4	Crystal	4.43 MHz
⚠ XB401	PU57069	Crystal OSC	or PU57070 4.43 MHz
CF401	PU56983	Ceramic Filter	4.2 MHz
⚠ CF402	PU57073	Ceramic Filter	13.3 MHz
LPF401	PU54988	Low Pass Filter	
BPF401	PU54410-2	Band Pass Filter	
BPF402	PU57072	Band Pass Filter	
DL401	PU57067	2H Comb Filter	or PU57068
	PU57215-2	Spacer	x7
	PQ41028-2	Spacer	x2
	PU50766	Test Pin	TP401 403—405,410 421—422, 425—432,GND

NOTE: "x2" indicates two pieces.

6.2.4 A/S/M board assembly [04]

..... PU11057C-2(E)
..... PU11057A-2(EB/EG)

—Audio in/out section—

Symbol No.	Part No.	Part Name	Description
IC401	TK10322	Integrated Circuit	
IC402	TK15050	Integrated Circuit	
IC403	M5218P	Integrated Circuit	
Q401	2SD636R,S	Transistor	
Q402	2SD636R,S	Transistor	
Q403	2SB641R,S	Transistor	
⚠ Q404	2SD639S	Transistor	
D401	1SS133	Diode	
D402	1SS133	Diode	
D403	1SS133	Diode	
R401	QRD161J-563	CR	
R402	QRD161J-472	CR	
R403	—	—	
R404	QRD162J-472	CR	
R405	—	—	
R406	—	—	
R407	QRD161J-104	CR	
R408	QRD161J-104	CR	
R409	QRD161J-103	CR	
R410	QRD161J-103	CR	
R411	QRD161J-473	CR	
R412	QRD161J-473	CR	
R413	—	—	
R414	QRD161J-104	CR	
⚠ R415	PU52108-470	Posistor	47 Ω
R419	QRD162J-472	CR	
R420	QRD161J-563	CR	
R421	QRD161J-472	CR	
R422	QRD161J-104	CR	
R423	QRD161J-104	CR	
R424	QRD161J-103	CR	
R425	QRD161J-103	CR	
R426	QRD161J-103	CR	
R427	QRD161J-103	CR	
R428	QRD161J-124	CR	
R429	QRD161J-124	CR	
R430	QRD161J-124	CR	
R431	QRD161J-124	CR	
R432	QRD161J-472	CR	
R433	QRD161J-392	CR	
R434	QRD161J-472	CR	
R435	QRD161J-392	CR	
R436	QRD187J-220	CR	
R437	QRD187J-220	CR	
R438	QRD161J-331	CR	
R439	QRD161J-331	CR	
R440	QRD161J-472	CR	
R441	QRD161J-472	CR	
⚠ R442	PU52108-470	Posistor	47 Ω
R443	QRD187J-103	CR	
R444	QRD187J-103	CR	
R445	QRD161J-223	CR	

(Audio in/out/S/M)

Symbol No.	Part No.	Part Name	Description
R446	QRD161J-473	CR	
R447	QRD161J-102	CR	
R448	PU56165-3	VR	Phone Level 10 kΩ
C401	–	–	
C402	QET61EM-475	E Cap	
C403	QET61EM-475	E Cap	
C404	QET61AM-226	E Cap	
C405	QET61AM-226	E Cap	
C406	–	–	
C407	QET61EM-475	E Cap	
C408	QET61EM-475	E Cap	
C409	QET61AM-476	E Cap	
C410	QET61EM-475	E Cap	
C411	QET61EM-475	E Cap	
C412	QET61EM-475	E Cap	
C413	QET61EM-475	E Cap	
C414	QET61EM-475	E Cap	
C415	QET61EM-475	E Cap	
C416	QET61EM-475	E Cap	
C417	QET61EM-475	E Cap	
C418	QET60JM-107	E Cap	
C419	QET60JM-107	E Cap	
C420	QET61AM-476	E Cap	
C421	QET61AM-476	E Cap	
C422	QET61CM-106	E Cap	
C423	QET61AM-107	E Cap	
C424	QET61AM-476	E Cap	
SW1	PU55852-1-2	Slide Switch	NR
SW2	PU55852-3-2	Slide Switch	AUDIO DUB
SW3	PU55852-4-2	Slide Switch	AUDIO OUT
SW4	PU55852-3-2	Slide Switch	REC SELECT
SW5	PU55852-3-2	Slide Switch	(EB/EG), A REC SEL
SW6	PU55852-1-2	Slide Switch	MEMORY
CN401	PU49215-4	Cap Housing	
CN402	–	–	
CN403	PU49215-2	Cap Housing	(E)
	PU49215-4	Cap Housing	(EB/EG)
CN404	PU49215-4	Cap Housing	
CN405	PU49215-2	Cap Housing	
CN406	PU49215-4	Cap Housing	
CN407	PU49215-6	Cap Housing	
CN408	PU49215-7	Cap Housing	
CN409	PU49215-9	Cap Housing	
CN410	PU49215-106	Cap Housing	
CN411	PU49215-2	Cap Housing	
	QMS6302-124	Head Phone Jack	
	QMS6331-001	Mic Jack	
	PQ10109-7	Jack Board	(E)
	PQ10109	Jack Board	(EB/EG)
	SDSF3008Z	Tapping Screw	x2 Jack Board
	PQ40404	Dust Spacer	x4 Jack Board
	PQ40404-3	Dust Spacer	x1 (E)
	PQ40404-3	Dust Spacer	x2 (EB/EG)
	PU55778-1-3	Hinge	x2
	PU57215-2	Spacer	x5

NOTES: "x2" indicates two pieces.

—Servo section—

(A/Servo/M)

Symbol No.	Part No.	Part Name	Description
IC1	BA6305LN	Integrated Circuit	
IC2	M51722P	Integrated Circuit	
IC3	M50766-602P	Integrated Circuit	
IC4	TC4066BP	Integrated Circuit	or MB84066BM
⚠ IC5	BA833S	Integrated Circuit	
IC6	BA6328	Integrated Circuit	
IC7	UPC324C	Integrated Circuit	
IC8	HA11780	Integrated Circuit	
IC9	BA6302A	Integrated Circuit	
IC10	AN6671K	Integrated Circuit	
Q1	DTA144WF	D Transistor	
Q2	2SB641R,S	Transistor	
Q3	2SD636R,S	Transistor	
Q4	DTA144WF	D Transistor	
Q5	2SA1020O,Y	Transistor	or 2SB911M P,Q,R,S
D1	DA203	Diode Array	
D2	1SS133	Diode	
D3	DA203	Diode Array	
D4	1SS133	Diode	
D5	1SS133	Diode	
D6	DA203	Diode Array	
D7	1SS133	Diode	
D8	RD3.3EB1	Zener Diode	
D9	RD8.2EB2	Zener Diode	
D10	RD13EB3	Zener Diode	
D11	1SS133	Diode	
D12	1SS133	Diode	
D13	DAN-201	Diode Array	
D14	DA203	Diode Array	
D15	1SS133	Diode	
D16	RD9.1EB2	Zener Diode	
D17	11DQ04	Diode	
D18	RD9.1EB2	Zener Diode	
D19	MA150	Diode	
R1	QRD161J-102	CR	
R2	QRD161J-684	CR	
R3	QRD161J-103	CR	
R4	QRD161J-331	CR	
R5	QRD161J-103	CR	
R6	QRD161J-105	CR	
R7	QRD161J-822	CR	
R8	QRD161J-103	CR	
R9	QRD161J-103	CR	
R10	QRD161J-105	CR	
R11	QRD161J-102	CR	
R12	QRD161J-683	CR	
R13	QRD161J-473	CR	
R14	QRD161J-273	CR	
R15	QRD181J-154	CR	
R16	QVZ3520-683	VR	CAP DISCR
R17	QRD161J-823	CR	
R18	QRD161J-473	CR	
R19	QRD161J-333	CR	
R20	QRD181J-103	CR	
R21	QRD161J-103	CR	

Symbol No.	Part No.	Part Name	Description
R22	QRD161J-103	CR	
R23	QRD161J-103	CR	
R24	QRD161J-472	CR	
R25	QRD161J-472	CR	
R26	QRD161J-152	CR	
R27	QRD167J-272	CR	
R28	QRD161J-472	CR	
R29	QRD161J-474	CR	
R30	QRD161J-223	CR	
R31	QRD161J-103	CR	
R32	QRD161J-103	CR	
R33	QRD161J-103	CR	
R34	QRD161J-333	CR	
R35	QRD161J-105	CR	
R36	QRD161J-333	CR	
R37	QRD161J-224	CR	
R38	QRD161J-824	CR	
R39	QRD161J-104	CR	
R40	QVZ3518-104	VR	REC SW
R41	QRD161J-104	CR	
R42	QRD161J-105	CR	
R43	QRD161J-104	CR	
R44	QRD161J-152	CR	
R45	QRD161J-394	CR	
R46	QRD161J-273	CR	
R47	QRD181J-333	CR	
R48	QVZ3518-223	VR	TRACKING PRE
R49	QRD161J-472	CR	
R50	PU56164-3	VR	B type 300 kΩ TRACKING
R51	QRD161J-334	CR	
R52	QRD161J-104	CR	
R53	QRD161J-474	CR	
R54	QRD161J-824	CR	
R55	QRD161J-334	CR	
R56	QRD161J-682	CR	
R57	QRD161J-682	CR	
R58	QRD161J-394	CR	
R59	QRD181J-223	CR	
R60	QVZ3518-105	VR	LP TRACK PRE
R61	–	–	
R62	QVZ3520-223	VR	H DISCR
R63	QRD181J-333	CR	
R64	QRD161J-104	CR	
R65	QRD161J-103	CR	
R66	QRD161J-103	CR	
R67	QRD161J-105	CR	
R68	QRD161J-103	CR	
R69	QRD161J-103	CR	
R70	QRD161J-563	CR	
R71	QRD161J-564	CR	
R72	QRD161J-472	CR	
R73	QRD161J-105	CR	
R74	QRD161J-104	CR	
R75	QRD181J-682	CR	
R76	QRD161J-102	CR	
R77	QRD161J-104	CR	
R78	QRD161J-153	CR	
R79	QRD161J-682	CR	
R80	QVZ3518-104	VR	V PULSE
R81	QRD161J-103	CR	

(A/Servo/M)

Symbol No.	Part No.	Part Name	Description
R82	QVZ3518-473	VR	D PU PULSE
R83	QRD181J-184	CR	
R84	QVZ3518-334	VR	CH1 SW
R85	QRD181J-184	CR	
R86	QVZ3518-334	VR	CH2 SW
R87	QRD181J-224	CR	
R88	QVZ3518-104	VR	LP DELAY
R89	QRD161J-563	CR	
R90	QRD161J-103	CR	
R91	QRD161J-102	CR	
R92	QRD161J-123	CR	
R93	–	–	
R94	QVZ3520-473	VR	D DISCR
R95	QRD161J-184	CR	
R96	QRD161J-563	CR	
R97	–	–	
R98	QRD161J-103	CR	
R99	QRD161J-564	CR	
R100	QRD161J-392	CR	
R101	QRD181J-222	CR	
R102	QRD181J-222	CR	
R103	QRD161J-102	CR	
R104	QRD161J-102	CR	
R105	–	–	
R106	QRD161J-222	CR	
R107	QRD161J-102	CR	
R108	–	–	
R109	QRD161J-222	CR	
R110	QRD161J-222	CR	
R111	QRD161J-222	CR	
R112	QRD161J-222	CR	
R113	QRD161J-821	CR	
R114	QRX019J-R82S	MFR	
R115	QRD161J-222	CR	
R116	QRD161J-473	CR	
R117	QRD161J-223	CR	
R118	QRD167J-561	CR	
R119	QRD161J-102	CR	
R120	QRD161J-333	CR	
R121	QRD161J-682	CR	
R122	QRD161J-104	CR	
R123	QRD161J-101	CR	
R124	QRD161J-332	CR	
⚠ R125	PU52108-2R2	Posistor	2.2 Ω
R126	QRD181J-332	CR	
R127	QRD161J-0R0	CR	
C1	PU57621-102	MY Cap	0.001 μF
C2	QER41CM-226	E Cap	
C3	QER41CM-476	E Cap	
C4	QER41CM-106	E Cap	
C5	PU57622-561	C Cap	560 pF
C6	QFN31HK-153	MY Cap	
C7	QER41CM-106	E Cap	
C8	QER41CM-226	E Cap	
C9	QER41CM-106	E Cap	
C10	QCS31HJ-271	C Cap	
C11	QER41HM-105	E Cap	
C12	QER41CM-106	E Cap	
C13	PU57621-102	MY Cap	0.001 μF
C14	PU57621-823	MY Cap	0.083 μF

Symbol No.	Part No.	Part Name	Description
C15	–	–	
C16	QFP42AJ-153	PP Cap	
C17	QEL61CM-106	E Cap	
C18	QEL61CM-106	E Cap	
C19	QEL61CM-106	E Cap	
C20	PU57621-333	MY Cap	0.033 μF
C21	PU57621-333	MY Cap	0.033 μF
C22	QCY31HK-331	C Cap	
C23	PU57621-223	MY Cap	0.022 μF
C24	PU57622-471	C Cap	470 pF
C25	QER41CM-226	E Cap	
C26	PU57621-104	MY Cap	0.1 μF
C27	QER41CM-106	E Cap	
C28	PU57621-104	MY Cap	0.1 μF
C29	PU57621-683	MY Cap	0.068 μF
C30	PU57621-333	MY Cap	0.033 μF
C31	PU57621-473	MY Cap	0.047 μF
C32	QCY31HK-331	C Cap	
C33	PU57621-102	MY Cap	0.001μF
C34	QEPC1HM-105	NP Cap	1 μF/50 V
C35	PU57621-223	MY Cap	0.022 μF
C36	PU57621-223	MY Cap	0.022 μF
C37	PU57621-104	MY Cap	0.1 μF
C38	PU57621-563	MY Cap	0.056 μF
C39	–	–	
C40	QFP42AJ-152	PP Cap	
C41	QFN31HK-102	MY Cap	
C42	QER41CM-106	E Cap	
C43	QEPC1HM-474	NP Cap	0.47 μF/50 V
C44	QEPA1EM-335	NP Cap	3.3 μF/25 V
C45	PU57621-222	MY Cap	0.0022 μF
C46	QEPA1CM-106	NP Cap	10 μF/16 V
C47	PU57621-683	MY Cap	0.068 μF
C48	QFN31HJ-332	MY Cap	
C49	QFN31HJ-682	MY Cap	
C50	PU57621-273	MY Cap	0.027 μF
C51	QFN31HK-102	MY Cap	
C52	QER41HM-105	E Cap	
C53	QFM41HJ-103	MY Cap	
C54	QFM41HJ-103	MY Cap	
C55	QFM41HJ-223	MY Cap	
C56	QER41CM-476	E Cap	
C57	QER41CM-106	E Cap	
C58	–	–	
C59	QFP42AJ-392	PP Cap	
C60	QFN31HK-103	MY Cap	
C61	QER41CM-336	E Cap	
C62	QFN31HK-682	MY Cap	
C63	QFN31HK-393	MY Cap	
C64	QER41CM-336	E Cap	
C65	QET61HM-225	E Cap	
C66	QET61HM-225	E Cap	
C67	QCS31HJ-470	C Cap	
C68	QET61HM-225	E Cap	
C69	QET61HM-225	E Cap	
C70	QFN31HK-223	MY Cap	
C71	QFN31HK-333	MY Cap	
C72	QFN31HK-104	MY Cap	
C73	QFN31HK-104	MY Cap	
C74	QFN31HK-223	MY Cap	
C75	QET61EM-107	E Cap	

Symbol No.	Part No.	Part Name	Description
C76	QET61EM-107	E Cap	
C77	QET61EM-107	E Cap	
C78	QER41CM-106	E Cap	
C79	QFN31HK-472	MY Cap	
C80	QER41HM-105	E Cap	
C81	QEL61CM-106	E Cap	
C82	PU57621-103	MY Cap	0.01 μF
C83	PU57622-820	C Cap	82 pF
C84	QFN31HK-223	MY Cap	
C85	PU57622-390	C Cap	39 pF
L1	PU55811-391	Coil	390 μH
⚠ X1	PU47701	Crystal	32.768 kHz
CN1	PU49215-2	Cap Housing	
CN2	PU49215-2	Cap Housing	
CN3	PU49215-8	Cap Housing	
	PU56527	Shield Case	DRUM MDA
	PU56528	Shield Plate	
	PU56529	Shield Cover	
	PQ41028-4	Spacer	x3

NOTE: "x3" indicates three pieces.

—Mechacon section—

Symbol No.	Part No.	Part Name	Description
IC201	LM339N	Integrated Circuit	
IC202	LA7225	Integrated Circuit	
IC203	LB1649	Integrated Circuit	
⚠ IC204	M50740-613SP	Integrated Circuit	
IC205	M50790SP	Integrated Circuit	
IC206	TC4013BP	Integrated Circuit	or UPD4013BC
Q201	–	–	
⚠ Q202	2SD638R,S	Transistor	
Q203	DTC124F	D Transistor	
Q204	DTA124F	D Transistor	
Q205	DTA124F	D Transistor	
Q206	DTC124F	D Transistor	
Q207	2SD637R,S	Transistor	
Q210	2SB643R,S	Transistor	
Q211	–	–	
Q212	–	–	
Q213	2SB641R,S	Transistor	
Q214	DTC124F	D Transistor	
Q215	2SD880Y,GR-102	Transistor	
Q216	2SD638R,S	Transistor	
Q219	DTA124F	D Transistor	
D201	1SS133	Diode	
D202	RD6.2EB1	Zener Diode	
D203	PD48PI2	Photo Diode	
D204	RD3.3EB2	Zener Diode	
D205	1SS133	Diode	
⚠ D206	HZ2C3	Zener Diode	
D207	1SS133	Diode	
D208	1SS133	Diode	
D209	1SS133	Diode	
D210	RD13EB1	Zener Diode	
D211	RD8.2EB2	Zener Diode	
D212	1SS133	Diode	
D213	RD12EB2	Zener Diode	
D214	RD7.5EB2	Zener Diode	
D217	1SS133	Diode	
D218	RD13EB2	Zener Diode	
D219	1SS133	Diode	
D220	1SS133	Diode	
D221	1SS133	Diode	
D222	1SS133	Diode	
D223	1SS133	Diode	
D224	1SS133	Diode	
D225	1SS133	Diode	
D226	RD6.2EB1	Zener Diode	
R201	QRD181J-102	CR	
R202	QRD181J-102	CR	
R203	QRD161J-274	CR	
R204	QRD161J-472	CR	
R205	QRD161J-563	CR	

(A/S/Mechacon)

Symbol No.	Part No.	Part Name	Description
R206	QRD181J-274	CR	
R207	QRD161J-472	CR	
R208	QRD161J-473	CR	
R209	QRD161J-104	CR	
R210	QRD161J-104	CR	
R211	QRD161J-332	CR	
R212	QRD161J-472	CR	
R213	QRD161J-184	CR	
R214	QRD181J-103	CR	
R215	QRD161J-222	CR	
R216	QRD161J-124	CR	
R217	QRD161J-124	CR	
R218	QRD161J-224	CR	
R219	QRD167J-104	CR	
R220	QRD161J-104	CR	
R221	QRD161J-120	CR	
R222	QRD161J-102	CR	
R223	QRD161J-152	CR	
R224	–	–	
R225	QRD161J-103	CR	
R226	QRD161J-103	CR	
R227	QRD161J-103	CR	
R228	QRD161J-103	CR	
R229	QRD161J-472	CR	
R230	QRD161J-103	CR	
R231	QRD167J-103	CR	
R232	QRD161J-105	CR	
R233	QRD161J-223	CR	
R234	QRD161J-223	CR	
R235	QRD161J-223	CR	
R236	QRD181J-821	CR	
R237	QRD181J-821	CR	
R238	QRD181J-821	CR	
R239	QRD181J-821	CR	
R240	QRD181J-821	CR	
R244	QRD181J-183	CR	
R245	QRD161J-183	CR	
R246	QRD161J-183	CR	
R247	QRD161J-103	CR	
R248	QRD161J-103	CR	
R249	QRD181J-183	CR	
R250	QRD181J-183	CR	
R251	QRD181J-103	CR	
R252	QRD181J-103	CR	
R253	QRD181J-103	CR	
R254	QRD181J-103	CR	
R255	QRD181J-103	CR	
R256	QRD181J-103	CR	
R257	QRD181J-561	CR	
R258	QRD181J-561	CR	
R259	QRD181J-561	CR	
R260	QRD181J-561	CR	
R261	QRD181J-561	CR	
R262	QRD161J-103	CR	
R263	–	–	
R264	QRD161J-103	CR	
R265	QRD181J-103	CR	
R266	QRD161J-103	CR	
R267	QRD161J-473	CR	
R268	QRD161J-103	CR	

Symbol No.	Part No.	Part Name	Description
R269	QRD181J-332	CR	
R270	QRD161J-332	CR	
R271	QRD161J-332	CR	
R272	QRD161J-682	CR	
R273	QRD161J-682	CR	
R274	QRD161J-562	CR	
R275	QRD161J-682	CR	
R276	QRD161J-103	CR	
R277	QRD161J-683	CR	
R278	QRD161J-101	CR	
R279	QRD181J-103	CR	
R280	QRD161J-222	CR	
R281	QRD181J-103	CR	
R282	QRD161J-472	CR	
R283	PU56164	VR	B type 20 kΩ P. SHARPNESS
R284	QRD161J-103	CR	
R285	QRD167J-103	CR	
R286	QRD181J-181	CR	
R287	QRD161J-121	CR	
R292	QRD167J-102	CR	
R293	QRD167J-103	CR	
R294	QRD167J-223	CR	
R295	–	–	
R296	QRD161J-222	CR	
⚠ R297	PU52108-3R3	Posistor	3.3 Ω
RA201	EXB-P84224M	Resistor Array	
RA202	EXB-P85103M	Resistor Array	
RA203	EXB-P84103M	Resistor Array	
RA204	EXB-P84103M	Resistor Array	
RA205	EXB-P84472M	Resistor Array	
C201	PU57621-223	MY Cap	0.022 μF
C202	PU57621-223	MY Cap	0.022 μF (E/EG)
C203	PU57621-823	MY Cap	0.082 μF
C204	PU57621-823	MY Cap	0.082 μF
C205	–	–	
C206	QEE41CM-475	T Cap	
C207	QCF31HP-223	C Cap	
C208	QCF31HP-102	C Cap	
C209	QET61EM-475	E Cap	
C210	QET60JM-476	E Cap	
C211	QET60JM-336	E Cap	
C212	QET40JM-476	E Cap	
C213	–	–	
C214	QER41HM-105	E Cap	
C215	PU57622-390	C Cap	39 pF
C216	PU57622-390	C Cap	39 pF
C217	–	–	
C218	PU57621-473	MY Cap	0.047 μF
C219	PU57622-101	C Cap	100 pF
C220	–	–	
C221	QET61HM-105	E Cap	
C222	QET61EM-106	E Cap	
C223	QFN41HJ-473	MY Cap	
C224	–	–	

Symbol No.	Part No.	Part Name	Description
C225	PU57621-223	MY Cap	0.022 μF
⚠ L201	PU53223-1R0H	Peaking Coil	1 μH
L202	PU52612	Resonator	40 kHz
L203	PU53223-101H	Peaking Coil	100 μH
L204	PU56181-101	Choke Coil	100 μH
L205	PU56181-101	Choke Coil	100 μH
L206	PU56181-330	Choke Coil	33 μH
⚠ CF201	PU56292	Ceramic Filter	3 MHz
CN201	PU49215-4	Cap Housing	
CN202	PU49215-4	Cap Housing	
CN203	–	–	
CN204	PU49215-4	Cap Housing	
CN205	PU49215-2	Cap Housing	
CN206	–	–	
CN207	–	–	
CN208	PU49215-10	Cap Housing	
CN209	PU49215-4	Cap Housing	
CN214	PU49215-4	Cap Housing	
CN215	–	–	
CN216	PU49215-7	Cap Housing	
⚠	PU35307-1-1	MDA Heat Sink	Q215
	PU45375-4	Transistor Spacer	Q215
	PU41624-6	Isolation Washer	Q215
	SPSP3006Z	Screw	Q215
	LPSP3008Z	Screw	MDA Heat Sink
	PU56572-1-1	Shield Cover	IFR RECEIVER
	PU56573-1-1	Shield Case	
	PU57362-1-1	Shield Plate	

6.2.5 Audio board assembly [05] PU11056A-1

Symbol No.	Part No.	Part Name	Description
IC1	TA7361P	Integrated Circuit	
IC2	AN3991K	Integrated Circuit	
IC3	TA7629P	Integrated Circuit	
IC4	TA7361P	Integrated Circuit	
IC5	AN3991K	Integrated Circuit	
IC6	TA7629P	Integrated Circuit	
Q1	2SD636R,S	Transistor	
Q2	2SD636R,S	Transistor	
Q3	2SD636R,S	Transistor	
Q4	2SD636R,S	Transistor	
Q5	–	–	
Q6	2SD636R,S	Transistor	
Q7	2SD636R,S	Transistor	
Q8	2SD636R,S	Transistor	
Q9	2SD636R,S	Transistor	
Q12	2SB641R,S	Transistor	
Q13	2SD636R,S	Transistor	
Q14	2SD636R,S	Transistor	
Q15	2SB644R,S	Transistor	
Q16	2SD958S,T,U	Transistor	
Q17	2SD958S,T,U	Transistor	
Q18	2SB788S,T,U	Transistor	
Q19	2SD636R,S	Transistor	
⚠ Q20	2SD639R,S	Transistor	
⚠ Q21	2SD639R,S	Transistor	
Q22	2SB644R,S	Transistor	
⚠ Q23	2SB822R	Transistor	
D1	1SS133	Diode	
D2	1SS133	Diode	
D3	1SS133	Diode	
D4	1SS133	Diode	
D5	1SS133	Diode	
D6	1SS133	Diode	
D7	1SS133	Diode	
D8	1SS133	Diode	
D9	1SS133	Diode	
D10	1SS133	Diode	
D11	1SS133	Diode	
D12	1SS133	Diode	
R1	QRD161J-223	CR	
R2	QRD161J-391	CR	
R3	QRD161J-182	CR	
R4	QRD161J-222	CR	
R5	QRD161J-103	CR	
R6	QRD187J-475	CR	
R7	QRD161J-182	CR	
R8	QRD161J-102	CR	
R9	QRD161J-473	CR	
R10	QRD161J-822	CR	
R11	QRD161J-331	CR	
R12	QRD161J-123	CR	
R13	QRD161J-223	CR	
R14	QRD161J-103	CR	

(Audio)

Symbol No.	Part No.	Part Name	Description
R15	QRD161J-393	CR	
R16	QRD161J-471	CR	
R17	QRD161J-333	CR	
R18	QRD161J-271	CR	
R19	QRD161J-224	CR	
R20	QRD161J-472	CR	
R21	QRD161J-473	CR	
R22	QRD161J-473	CR	
R23	QVZ3521-102	VR	1 kΩ CH1 PB LEVEL
R24	QRD161J-103	CR	
R25	QRD161J-223	CR	
R26	QRD161J-103	CR	
R27	QVZ3521-103	VR	10 kΩ CH1 REC LEVEL
R28	QRD181J-223	CR	
R29	QRD161J-223	CR	
R30	QRD161J-330	CR	
R31	QRD161J-270	CR	
R32	QRD161J-473	CR	
R33	QRD181J-473	CR	
R34	QRD181J-273	CR	
⚠ R35	PU52108-100	Posistor	10 Ω
R36	QRD161J-274	CR	
R37	QRD181J-273	CR	
R38	QRD161J-473	CR	
⚠ R39	PU52108-100	Posistor	10 Ω
R40	QRD161J-681	CR	
R41	QRD161J-154	CR	
R42	QRD161J-104	CR	
R43	QRD161J-332	CR	
R44	QRD181J-272	CR	
R45	QRD161J-332	CR	
R46	–	–	
R47	QRD161J-332	CR	
R48	–	–	
R49	QRD161J-223	CR	
R50	QRD161J-181	CR	
R51	QRD161J-223	CR	
R52	QRD161J-391	CR	
R53	QRD161J-182	CR	
R54	QRD161J-222	CR	
R55	QRD161J-103	CR	
R56	QRD187J-475	CR	
R57	QRD161J-182	CR	
R58	QRD161J-102	CR	
R59	QRD161J-473	CR	
R60	QRD161J-822	CR	
R61	QRD161J-331	CR	
R62	QRD161J-123	CR	
R63	QRD161J-223	CR	
R64	QRD161J-103	CR	
R65	QRD161J-393	CR	
R66	QRD161J-471	CR	
R67	QRD161J-333	CR	
R68	QRD161J-271	CR	
R69	QRD161J-224	CR	
R70	QRD161J-472	CR	
R71	QRD161J-473	CR	
R72	QRD181J-473	CR	

Symbol No.	Part No.	Part Name	Description
R73	QVZ3521-102	VR	1 kΩ CH2 PB LEVEL
R74	QRD161J-103	CR	
R75	QRD161J-223	CR	
R76	QRD161J-103	CR	
R77	QVZ3521-103	VR	10 kΩ CH2 REC LEVEL
R78	QRD181J-223	CR	
R79	QRD161J-223	CR	
R80	QRD161J-330	CR	
R81	QRD161J-270	CR	
R82	QRD161J-473	CR	
R83	QRD181J-473	CR	
R84	QRD181J-273	CR	
⚠ R85	PU52108-100	Posistor	10 Ω
R86	QRD161J-274	CR	
R87	QRD181J-273	CR	
R88	QRD161J-473	CR	
⚠ R89	PU52108-100	Posistor	10 Ω
R90	QRD161J-681	CR	
R91	QRD161J-154	CR	
R92	QRD161J-104	CR	
R93	QRD161J-332	CR	
R94	QRD161J-272	CR	
R95	QRD161J-332	CR	
R96	–	–	
R97	QRD181J-332	CR	
R98	–		
R99	QRD161J-223	CR	
R100	QRD161J-181	CR	
R101	QRD161J-153	CR	
R102	QRD161J-153	CR	
R103	QRD161J-272	CR	
R104	QRD161J-272	CR	
R105	–	–	
R106	QRD161J-103	CR	
R107	QRD161J-223	CR	
R108	QRD161J-223	CR	
R109	QRD161J-332	CR	
R110	QRD161J-332	CR	
R111	QRD161J-223	CR	
R112	QRD161J-473	CR	
R113	QRD161J-103	CR	
R114	QRD181J-223	CR	
R115	QRD161J-473	CR	
R116	QRD161J-103	CR	
R117	QRD161J-332	CR	
R118	QRD161J-103	CR	
R119	QVZ3521-683	VR	68 kΩ CH1 BIAS ADJ
R120	QVZ3521-683	VR	68 kΩ CH2 BIAS ADJ
R121	QRD161J-393	CR	
R122	QRD181J-103	CR	
R123	QRD161J-472	CR	
R124	QRD161J-122	CR	
R125	QRD161J-562	CR	
R126	QRD161J-562	CR	
R127	QRD161J-473	CR	
R128	QRD161J-473	CR	
⚠ R129	QRZ0054-150	FR	15 Ω
R130	QRD161J-102	CR	

Symbol No.	Part No.	Part Name	Description
R131	QRD161J-102	CR	
R132	QRD181J-103	CR	
R133	QRD161J-222	CR	
R134	QRD161J-123	CR	
R135	QRD161J-123	CR	
R136	QRD161J-102	CR	
R137	QRD161J-332	CR	
R138	QRD161J-0R0	CR	
R139	QRD161J-0R0	CR	
R140	QRD181J-0R0	CR	
R141	QRD161J-472	CR	
R142	QRD161J-472	CR	
C1	PU57622-121	C Cap	120 pF
C2	QER41HM-474	E Cap	
C3	QER41CM-226	E Cap	
C4	QEK61HM-224	E Cap	
C5	QET61AM-336	E Cap	
C6	QET61EM-475	E Cap	
C7	QET61EM-475	E Cap	
C8	QET60JM-336	E Cap	
C9	QET61HM-335	E Cap	
C10	QFN31HJ-683	MY Cap	
C11	PU57621-472	MY Cap	0.0047 μF
C12	QER41AM-476	E Cap	
C13	PU57622-681	C Cap	680 pF
C14	QEL61HM-105	E Cap	
C15	PU57621-102	MY Cap	0.001 μF
C16	QEK61HM-334	E Cap	
C17	QET61CM-226	E Cap	
C18	PU57621-223	MY Cap	0.022 μF
C19	QER41CM-106	E Cap	
C20	QET61EM-335	E Cap	
C21	QER41HM-104	E Cap	
C22	QER41EM-335	E Cap	
C23	PU57621-683	MY Cap	0.068 μF
C24	QFN31HJ-154	MY Cap	
C25	QEK61HM-474	E Cap	
C26	PU57622-101	C Cap	100 pF
C27	QET61AM-107	E Cap	
C28	QER41HM-334	E Cap	
C29	QER41HM-104	E Cap	
C30	QER41CM-106	E Cap	
C31	PU57621-473	MY Cap	0.047 μF
C32	PU57621-472	MY Cap	0.0047 μF
C33	QER41CM-106	E Cap	
C34	PU57621-472	MY Cap	0.0047 μF
C35	QET61AM-476	E Cap	
C36	QET61AM-476	E Cap	
C37	QET61EM-335	E Cap	
C38	–	–	
C39	QET61EM-335	E Cap	
C40	QER41CM-106	E Cap	
C41	QFN31HJ-562	MY Cap	
C42	PU57621-273	MY Cap	0.027 μF
C43	QCS31HJ-121	C Cap	
C44	QEK61HM-474	E Cap	
C45	QER41CM-226	E Cap	
C46	QEK61HM-224	E Cap	
C47	QER41CM-336	E Cap	

Symbol No.	Part No.	Part Name	Description
C48	QER41EM-475	E Cap	
C49	QER41EM-475	E Cap	
C50	QER40JM-336	E Cap	
C51	QET61EM-335	E Cap	
C52	PU57621-683	MY Cap	0.068 μF
C53	PU57621-472	MY Cap	0.0047 μF
C54	QER41AM-476	E Cap	
C55	PU57622-681	C Cap	680 pF
C56	QEL61HM-105	E Cap	
C57	QFN31HJ-102	MY Cap	
C58	QER41HM-334	E Cap	
C59	QET61CM-226	E Cap	
C60	PU57621-223	MY Cap	0.022 μF
C61	QET61CM-106	E Cap	
C62	QER41EM-335	E Cap	
C63	QER41HM-104	E Cap	
C64	QET61EM-335	E Cap	
C65	QFN31HJ-683	MY Cap	
C66	QFN31HJ-154	MY Cap	
C67	QEK61HM-474	E Cap	
C68	QCS31HJ-101	C Cap	
C69	QET61AM-107	E Cap	
C70	QER41HM-334	E Cap	
C71	QER41HM-104	E Cap	
C72	QER41CM-106	E Cap	
C73	PU57621-473	MY Cap	0.047 μF
C74	PU57621-472	MY Cap	0.0047 μF
C75	QER41CM-106	E Cap	
C76	PU57621-472	MY Cap	0.0047 μF
C77	QER41AM-476	E Cap	
C78	QER41AM-476	E Cap	
C79	QET61EM-335	E Cap	
C80	–	–	
C81	QET61EM-335	E Cap	
C82	QER41CM-106	E Cap	
C83	PU57621-562	MY Cap	0.0056 μF
C84	PU57621-273	MY Cap	0.027 μF
C85	–	–	
C86	–	–	
C87	PU57622-561	C Cap	560 pF
C88	PU57622-561	C Cap	560 pF
C89	QCS31HJ-561	C Cap	
C90	QFP42AJ-273	PP Cap	
C91	QET61CM-476	E Cap	
C92	QFN31HJ-333	MY Cap	
C93	QFN31HJ-153	MY Cap	
C94	QFN31HJ-103	MY Cap	
C95	QFN31HJ-103	MY Cap	
C96	–	–	
C97	QET61HM-105	E Cap	
L1	PU54710-222	Coil	2.2 mH
L2	PU54710-392	Coil	3.9 mH
L3	PU53615-2	Low Pass Filter	
L4	PU54710-222	Coil	2.2 mH
L5	PU54710-392	Coil	3.9 mH
L6	PU53615-2	Low Pass Filter	
L7	PU53618-221J	Peaking Coil	220 μH
L8	PU53618-560J	Peaking Coil	5.6 μH
L9	PU53618-100J	Peaking Coil	10 μH

(Audio)

Symbol No.	Part No.	Part Name	Description
⚠ T1	PU56138	OSC Transformer	
RY1	PU55259	Relay	
RY2	PU55259	Relay	
RY3	PU55259	Relay	
CN1	PU49215-103	Cap Housing	
CN2	PU49215-103R	Cap Housing	
CN3	–	–	
CN4	PU49215-104	Cap Housing	
CN9	PU49215-109	Cap Housing	
CN10	PU49215-106	Cap Housing	
	PQ40406	Board Holder	x2 PWB ass'y
	DPSP3006Z	Screw	x2 PWB ass'y
	PU57790	Shield Case	BIAS OSC
	PU57791	Shield Cover	

NOTE: "x2" indicates two pieces.

6.2.6 Operation board assembly [06]

Operation 1 board assembly PU21931A1

Symbol No.	Part No.	Part Name	Description
D1	SLR-34MT4	LED	STAND BY
D2	SLP-981C-50	LED	OPERATE
D3	–	–	
D4	SLP-981C-50	LED	LP
D5	SLP-981C-50	LED	NR
R1	QRD161J-331	CR	
R2	QRD161J-331	CR	
R3	–	–	
R4	QRD161J-331	CR	
R5	QRD161J-102	CR	
SW2	QSP2256-001	Push Switch	SP/LP
SW3	QSP2256-003	Push Switch	OPERATE
SW4	QSP2256-001	Push Switch	TIMER
	PU56692	LED Shade	D1,4,5
	PU56940-2	LED Holder	D1,2,4,5

Operation 2 board assembly PU21931A2

Symbol No.	Part No.	Part Name	Description
⚠ IC1	M50115AP	Integrated Circuit	
D6	1SS133	Diode	
C1	QCS11HJ-151	C Cap	
C2	QCS11HJ-151	C Cap	
⚠ CF1	PU49487-2	Ceramic Filter	455 kHz
SW5	PU53598-2	Tact Switch	FF
SW6	PU53598-2	Tact Switch	PLAY
SW7	PU53598-2	Tact Switch	PAUSE/STILL
SW8	PU53598-2	Tact Switch	REW
SW9	PU53598-2	Tact Switch	STOP
SW10	PU53598-2	Tact Switch	EJECT
SW11	PU53598-2	Tact Switch	REC
SW12	PU53598-2	Tact Switch	AUDIO DUB

6.2.7 (a) Tuner/IF board assembly [07]

..... PU21895F1(E)

Symbol No.	Part No.	Part Name	Description
⚠ TNR1	PU34219-1-2	Tuner	
⚠ IC1	M51316P	Integrated Circuit	
IC2	LA7910	Integrated Circuit	
IC3	UPC358C	Integrated Circuit	
Q1	2SC2636S,T	Transistor	
Q2	–	–	
Q3	–	–	
Q4	2SB641R,S	Transistor	
Q5	2SD637R,S	Transistor	
Q6	2SD637R,S	Transistor	
Q7	2SD637R,S	Transistor	
Q8	–	–	
Q9	2SD639S	Transistor	
Q10	2SD1206R	Transistor	
Q11	2SD637R,S	Transistor	
Q12	DTC144F	D Transistor	
Q13	–	–	
Q14	2SB810E,F	Transistor	or 2SB598E,F
Q15	2SD637R,S	Transistor	
Q16	2SB644R,S	Transistor	
Q17	2SD639S	Transistor	
Q18	2SD637R,S	Transistor	
D1	RD6.8EB2	Zener Diode	
D2	1SS133	Diode	
D3	1SS133	Diode	
D4	1SS133	Diode	
D5	1SS133	Diode	
D6	1SS133	Diode	
D7	1SS133	Diode	
D8	LTZ-R15	LED	
⚠ D9	UPC574J-KL	Integrated Circuit	
D10	–	–	
D11	1SS133	Diode	
D12	1SS133	Diode	
D13	1SS133	Diode	
R1	QRD161J-750	CR	
R2	QRD161J-331	CR	
R3	QRD161J-103	CR	
R4	QRD161J-152	CR	
R5	QRD161J-470	CR	
R6	QRD161J-681	CR	
R7	QRD161J-101	CR	
R8	QRD161J-150	CR	
R16	QRD161J-102	CR	
R17	QVZ1802-472	VR	RF AGC
R18	QRD161J-102	CR	
R19	QRD161J-222	CR	
R20	QRD161J-153	CR	
R21	QRD161J-334	CR	
R22	QRD161J-332	CR	

Symbol No.	Part No.	Part Name	Description
R23	QRD161J-332	CR	
R24	QRD161J-101	CR	
R25	QRD161J-474	CR	
R26	QRD161J-104	CR	
R27	QRD161J-331	CR	
R28	QRD161J-102	CR	
R29	QRD161J-223	CR	
R30	QRD161J-273	CR	
R31	QRD161J-122	CR	
R32	QRD161J-222	CR	
R33	QRD161J-822	CR	
R34	QRD161J-104	CR	
R35	QVZ1802-332	VR	COLOUR LEVEL
R36	QRD161J-682	CR	
R37	QRD161J-471	CR	
R38	QRD161J-151	CR	
R39	QRD161J-100	CR	
R40	QRD161J-334	CR	
R41	QRD161J-103	CR	
R42	QRD161J-471	CR	
R43	QRD161J-103	CR	
R44	QRD161J-103	CR	
R45	QRD161J-103	CR	
R46	QRD161J-331	CR	
R47	QRD161J-223	CR	
R48	QRD161J-222	CR	
R52	QRD161J-104	CR	
R53	QRD161J-104	CR	
R54	QRD161J-103	CR	
R55	QRD161J-472	CR	
R56	–	–	
R57	QRD161J-104	CR	
R58	QRD161J-104	CR	
R59	QRD161J-103	CR	
R60	–		
R61	–	–	
R62	QRD161J-224	CR	
R63	QRD161J-333	CR	
R64	QRD161J-394	CR	
R65	QRD161J-103	CR	
R66	QRD161J-103	CR	
R67	QRD161J-154	CR	
R68	QRD161J-154	CR	
R69	QRD161J-154	CR	
R70	QRD161J-104	CR	
R74	QRD161J-473	CR	
R75	QRD187J-121	CR	
R76	QRD187J-332	CR	
R77	–	–	
R78	QRD161J-272	CR	
R79	QRD167J-224	CR	
⚠ R80	QRD167J-222	CR	
R81	QRD161J-103	CR	
R82	QRD161J-472	CR	
R83	QRD161J-472	CR	
R84	QRD161J-472	CR	
R85	QRD161J-102	CR	
R86	QRD161J-473	CR	
R87	QRD161J-473	CR	

(Tuner/IF)

Symbol No.	Part No.	Part Name	Description
R88	PU52108-150	CR	15 Ω
R89	PU52108-4R7	Posistor	4.7 Ω
R90	QRD161J-331	CR	
R91	QRD161J-471	CR	
R92	QRD161J-473	CR	
R93	QRD161J-122	CR	
R94	QRD161J-332	CR	
R95	QRD161J-471	CR	
R96	QRD161J-471	CR	
⚠ R97	QRZ0054-100	FR	10 Ω
R98	QVZ1802-103	VR	AUDIO LEVEL
R99	QRD161J-103	CR	
R100	QRD161J-223	CR	
R101	QRD161J-393	CR	
R110	QRD161J-103	CR	
C9	QCY31HK-222	C Cap	
C10	QCY31HK-222	C Cap	
C11	QCY31HK-102	C Cap	
C18	QCY31HK-222	C Cap	
C19	–	–	
C20	QCY31HK-222	C Cap	
C21	QCY31HK-222	C Cap	
C22	QCY31HK-222	C Cap	
C23	QCY31HK-222	C Cap	
C24	QET61HM-474	E Cap	
C25	QCY31HK-222	C Cap	
C26	QET61CM-106	E Cap	
C27	QFN31HK-473	MY Cap	
C28	QET61CM-106	E Cap	
C29	QET61EM-475	E Cap	
C30	–	–	
C31	QET61HM-105	E Cap	
C32	QCY31HK-222	C Cap	
C33	QCT25CH-180	C Cap	
C34	QCT25LH-560	C Cap	
C35	QCY31HK-102	C Cap	
C36	QCT25HH-680	C Cap	68 pF/50 V
C37	QCT25CH-6R0	C Cap	6 pF/50 V
C38	–	–	
C39	–	–	
C40	QFN31HK-104	MY Cap	
C41	QET61CM-336	E Cap	
C42	QET61CM-106	E Cap	
C43	QCS31HJ-180	C Cap	
C44	QCS31HJ-180	C Cap	
C45	QET61CM-107	E Cap	
C46	QCF31HP-103	C Cap	
C47	QET61HM-105	E Cap	
C48	QFN31HK-102	MY Cap	
C49	–	–	
C50	QET61CM-106	E Cap	
C51	QET61CM-106	E Cap	

Symbol No.	Part No.	Part Name	Description
C52	QFN31HK-223	MY Cap	
C53	QFN31HK-223	MY Cap	
C54	–	–	
C55	QET61HM-105	E Cap	
C56	–	–	
C57	QET61HM-225	E Cap	
C58	QET61CM-227	E Cap	
C59	–	–	
C60	QCY31HK-102	C Cap	
C61	QFN31HJ-333	MY Cap	
C62	QFN31HJ-333	MY Cap	
C63	QFN31HJ-153	MY Cap	
C64	QFN31HJ-153	MY Cap	
C65	QCF31HP-103	C Cap	
C66	–	–	
C67	QCY31HK-222	C Cap	
C68	QET61EM-475	E Cap	
C69	–	–	
C70	–	–	
C71	QET61HM-474	E Cap	
C72	QET61CM-106	E Cap	
C73	QET61CM-106	E Cap	
C74	QET61HM-106	E Cap	
C75	QET61CM-336	E Cap	
C76	QET61HM-106	E Cap	
C77	QET61HM-106	E Cap	
C78	QCS31HJ-101	C Cap	
C79	QET61CM-476	E Cap	
C90	QFN31HJ-222	MY Cap	
C91	QCF31HP-223	C Cap	
C92	QFN31HJ-562	MY Cap	
C93	QFN31HJ-102	MY Cap	
C94	QET61CM-106	MY Cap	
C95	QCS31HJ-470	C Cap	
C96	QCF31HP-223	C Cap	
C97	QET61CM-336	E Cap	
C98	QET61HM-474	E Cap	
C99	QET61CM-106	E Cap	
C105	QET61CM-106	E Cap	
L5	PU53606-R22	Coil	or PU49995-R22 0.22 μH
L6	PU53606-1R0	Coil	1 μH
L7	PU48530-6R8K	Peaking Coil	6.8 μH
L8	PU48530-100J	Peaking Coil	10 μH
L9	PU48530-271J	Peaking Coil	270 μH
L10	PU48530-150J	Peaking Coil	15 μH
L11	PU48530-470J	Peaking Coil	47 μH
⚠ T1	PU55955-3	Coil	34.47 MHz,SAW
⚠ T2	PU55267	IFT	33.4 MHz, S. TRAP
⚠ T3	PU55957-3	Coil	38.9 MHz
⚠ T4	PU55268	IFT	AFC, 38.9 MHz
⚠ T5	PU51467	IFT	15.625 kHz

6.2.7 (b) Tuner/IF board assembly [07] PU21895H1(EB) PU21895D1(EG)

Symbol No.	Part No.	Part Name	Description
⚠ CF1	PU32990-2	Ceramic Filter	5.5 MHz
⚠ CF2	PU55189	Ceramic Filter	6 MHz
⚠ CF3	PU55270	Ceramic Filter	6 MHz
SAW1	PU34218	Saw Filter	
CN4	PU49215-2	Cap Housing	
CN13	PU49215-2	Cap Housing	
	PU51721	Test Pin	TP12A,B TP14, TP21
	PU35160	Shield Case (1)	IF AMP
	PU35161-1-2	Shield Plate (1)	
	PU35162-1-2	Shield Cover (1)	
	PU34548	Shield Case (2)	IC 1
	PU34551	Shield Plate (2)	
	PU35159-1-3	Shield Cover (2)	

Symbol No.	Part No.	Part Name	Description
⚠ TNR1	PU34219-8	Tuner	(EB)
	PU34219-8-1	Tuner	(EG)
⚠ IC1	M51316P	Integrated Circuit	
IC2	LA7910	Integrated Circuit	
IC3	UPC358C	Integrated Circuit	
Q1	2SC2636S,T	Transistor	
Q2	2SC2636S,T	Transistor	
Q3	—	—	
Q4	2SB641R,S	Transistor	
Q5	2SD637R,S	Transistor	
Q6	2SD637R,S	Transistor	
Q7	2SD637R,S	Transistor	
Q8	—	—	
Q9	2SD639S	Transistor	
Q10	2SD1206R	Transistor	
Q11	2SD637R,S	Transistor	
Q12	DTC144F	D Transistor	
Q13	DTC144F	D Transistor	
Q14	2SB810E,F	Transistor	or 2SB598E,F
Q15	2SD637R,S	Transistor	
Q16	2SB644R,S	Transistor	
Q17	2SD639S	Transistor	
D1	RD6.8EB2	Zener Diode	
D2	1SS133	Diode	
D3	1SS133	Diode	
D4	1SS133	Diode	
D5	1SS133	Diode	
D6	1SS133	Diode	
D7	1SS133	Diode	
D8	LTZ-R15	LED	
⚠ D9	UPC574J-KL	Integrated Circuit	
R2	QRD161J-331	CR	
R3	QRD161J-103	CR	
R4	QRD161J-152	CR	
R5	QRD161J-470	CR	
R6	QRD161J-681	CR	
R7	QRD161J-101	CR	
R8	—	—	
R9	QRD161J-103	CR	
R10	QRD161J-152	CR	
R11	QRD161J-101	CR	
R12	QRD161J-221	CR	
R13	QRD161J-470	CR	
R14	—	—	
R15	—	—	
R16	QRD161J-102	CR	
R17	QVZ1802-472	VR	RF AGC
R18	QRD161J-102	CR	
R19	QRD161J-222	CR	
R20	QRD161J-153	CR	
R21	QRD161J-334	CR	
R22	QRD161J-332	CR	
R23	QRD161J-332	CR	

(Tuner/IF)

Symbol No.	Part No.	Part Name	Description
R24	QRD161J-101	CR	
R25	QRD161J-474	CR	
R26	QRD161J-104	CR	
R27	QRD161J-331	CR	
R28	QRD161J-102	CR	
R29	QRD161J-223	CR	
R30	QRD161J-273	CR	
R31	QRD161J-122	CR	
R32	QRD161J-222	CR	
R33	QRD161J-822	CR	
R34	QRD161J-104	CR	
R35	QVZ1802-332	VR	COLOUR LEVEL
R36	–	–	
R37	QRD161J-471	CR	
R38	QRD161J-151	CR	
R39	QRD161J-100	CR	
R40	QRD161J-334	CR	
R41	QRD161J-103	CR	
R42	QRD161J-471	CR	
R43	QRD161J-103	CR	
R44	QRD161J-103	CR	
R45	QRD161J-103	CR	
R46	QRD161J-331	CR	
R47	QRD161J-223	CR	
R48	QRD161J-222	CR	
R52	QRD161J-104	CR	
R53	QRD161J-104	CR	
R54	QRD161J-103	CR	
R55	QRD161J-472	CR	
R56	–	–	
R57	QRD161J-104	CR	
R58	QRD161J-104	CR	
R59	QRD161J-103	CR	
R60	–	–	
R61	–	–	
R62	QRD161J-224	CR	
R63	QRD161J-333	CR	
R64	QRD161J-394	CR	
R65	QRD161J-103	CR	
R66	QRD161J-103	CR	
R67	QRD161J-154	CR	
R68	QRD161J-154	CR	
R69	QRD161J-154	CR	
R70	QRD161J-104	CR	
R74	QRD161J-473	CR	
R75	QRD187J-121	CR	
R76	QRD187J-332	CR	
R77	–	–	
R78	QRD161J-272	CR	
R79	QRD167J-224	CR	
⚠ R80	QRD167J-222	CR	
R81	QRD161J-103	CR	
R82	QRD161J-472	CR	
R83	QRD161J-472	CR	
R84	QRD161J-472	CR	
R85	QRD161J-102	CR	
R86	QRD161J-473	CR	
R87	QRD161J-473	CR	
⚠ R88	PU52108-150	Posistor	15 Ω

Symbol No.	Part No.	Part Name	Description
⚠ R89	PU52108-4R7	Posistor	4.7 Ω
R110	QRD161J-103	CR	
C1	QCY31HK-102	C Cap	
C2	–	–	
C3	–	–	
C4	QCY31HK-102	C Cap	
C5	QCY31HK-102	C Cap	
C9	QCY31HK-222	C Cap	
C10	QCY31HK-222	C Cap	
C11	QCY31HK-102	C Cap	
C12	QCY31HK-102	C Cap	
C13	QCY31HK-102	C Cap	
C14	QCY31HK-222	C Cap	
C15	QCY31HJ-220	C Cap	
C20	QCY31HK-222	C Cap	
C21	QCY31HK-222	C Cap	
C22	QCY31HK-222	C Cap	
C23	QCY31HK-222	C Cap	
C24	QET61HM-474	E Cap	
C25	QCY31HK-222	C Cap	
C26	QET61CM-106	E Cap	
C27	QFN31HK-473	MY Cap	
C28	QET61CM-106	E Cap	
C29	QET61EM-475	E Cap	
C30	–	–	
C31	QET61HM-105	E Cap	
C32	QCY31HK-222	C Cap	
C33	QCT25CH-180	C Cap	18 pF/50 V
C34	QCT25LH-560	C Cap	56 pF/50 V
C35	QCY31HK-102	C Cap	
C36	QCT25HH-680	C Cap	68 pF/50 V
C37	QCT25CH-6R0	C Cap	6 pF/50 V
C38	–	–	
C39	–	–	
C40	QFN31HK-104	MY Cap	
C41	QET61CM-336	E Cap	
C42	QET61CM-106	E Cap	
C43	QCS31HJ-180	C Cap	
C44	–	–	
C45	QET61CM-107	E Cap	
C46	QCF31HP-103	C Cap	
C47	QET61HM-105	E Cap	
C48	QFN31HK-102	MY Cap	
C49	–	–	
C50	QET61CM-106	E Cap	
C51	QET61CM-106	E Cap	
C52	QFN31HK-223	MY Cap	
C53	QFN31HK-223	MY Cap	
C54	–	–	
C55	QET61HM-105	E Cap	
C56	–	–	
C57	QET61HM-225	E Cap	
C58	QET61CM-227	E Cap	
C59	–	–	
C60	QCY31HK-102	C Cap	

6.2.8 Display board assembly [08]

..... PU11074P1-3 (E)
PU11074C1-3 (EB)
PU11074A1-3 (EG)

Symbol No.	Part No.	Part Name	Description
C61	QFN31HJ-333	MY Cap	
C62	QFN31HJ-333	MY Cap	
C63	QFN31HJ-153	MY Cap	
C64	QFN31HJ-153	MY Cap	
C65	QCF31HP-103	C Cap	
C66	–	–	
C67	QCY31HK-222	C Cap	
C68	QET61EM-475	E Cap	
C69	–	–	
C70	–	–	
C71	QET61HM-474	E Cap	
C72	QET61CM-106	E Cap	
C73	QET61CM-106	E Cap	
C74	QET61HM-106	E Cap	
C75	QET61CM-336	E Cap	
C76	QET61HM-106	E Cap	
C77	QET61HM-106	E Cap	
C78	QCS31HJ-101	C Cap	
C79	QET61CM-476	E Cap	
C105	QET61CM-106	E Cap	
L1	PU53606-R22	Coil	or PU49995-R22 0.22 μH
L2	PU53606-R22	Coil	or PU49995-R22 0.22 μH
L3	PU57228	Coil	31.65 MHz
L4	–	–	
L5	–	–	
L6	PU53606-1R0	Coil	1 μH
L7	PU48530-6R8K	Peaking Coil	6.8 μH
L8	PU48530-100J	Peaking Coil	10 μH
L9	PU48530-271J	Peaking Coil	270 μH
L10	PU48530-150J	Peaking Coil	15 μH
L11	PU48530-470J	Peaking Coil	47 μH
⚠ T1	PU55955-3	Coil	34.47 MHz, SAW
⚠ T2	PU55267	IFT	33.4 MHz, S. TRAP
⚠ T3	PU55957-3	Coil	38.9 MHz, LLD
⚠ T4	PU55268	IFT	AFC, 38.9 MHz
⚠ T5	PU51467	IFT	15.625 kHz
⚠ T6	PU32177-3	Coil	37.4 MHz, IF TU
⚠ CF1	PU32990-2	Ceramic Filter	6 MHz
SAW1	PU34218	Saw Filter	
CN4	PU49215-2	Cap Housing	
CN8	PU43351-4	Cap Housing	
CN9	QMC0131-002	Jack Assembly	
	PU51721	Test Pin	TP12A,B TP14
	PU35160	Shield Case (1)	IF AMP
	PU35161-1-2	Shield Plate (1)	
	PU35162-1-2	Shield Cover (1)	
	PU34548	Shield Case (2)	IC 1
	PU34551	Shield Plate (2)	
	PU35159-1-3	Shield Cover (2)	

Symbol No.	Part No.	Part Name	Description
IC101	MN1250BJA	Integrated Circuit	
D101	MA167	Diode	
D102	MA167	Diode	
D103	MA167	Diode	
D104	MA167	Diode	
D105	MA167	Diode	
D106	MA167	Diode	
D107	UZ10B	Zener Diode	
D108	–	–	
D109	–	–	
D110	SLR-34VC4	LED	or SLP-981C-50 BILINGUAL (EG/EB)
D111	SLR-34VC4	LED	or SLP-981C-50 STEREO (EG/EB)
D112	SLR-34VC4	LED	or SLP-981C-50 SIMULCAST
FDP1	PU57345-3	FDP	(E/EB)
	PU57345-4	FDP	(EG)
R101	QRD161J-102	CR	
R102	QRD161J-102	CR	
R103	QRD161J-561	CR	
R104	QRD161J-153	CR	
R105	QRD161J-104	CR	
R106	QRD161J-223	CR	
R107	QRD161J-223	CR	
R120	QRD161J-103	CR	
R121	QRD161J-103	CR	
RA101	EXB-P811333M	Resistor Array	
RA102	EXB-P811333M	Resistor Array	
C101	QET61HM-225	E Cap	
C102	QET61HM-225	E Cap	
C103	QCS31HJ-470	C Cap	
C104	QET61HM-474	E Cap	
SW101	PU57551	Tact Switch	SP/LP
SW102	PU57551	Tact Switch	INSTANT REC
SW103	PU57551	Tact Switch	CH UP
SW104	PU57551	Tact Switch	CH DOWN
SW105	PU57551	Tact Switch	DIMMER
SW106	PU57551	Tact Switch	MIN –
SW107	PU57551	Tact Switch	MIN +
SW108	PU57551	Tact Switch	HOUR
SW109	PU57551	Tact Switch	DAY
SW110	PU57551	Tact Switch	CH

(Display)

Symbol No.	Part No.	Part Name	Description
SW111	PU57551	Tact Switch	STOP
SW112	PU57551	Tact Switch	START
SW113	PU57551	Tact Switch	REPEAT
SW114	PU57551	Tact Switch	CANCEL
SW115	PU57551	Tact Switch	PROGRAM
SW116	PU57551	Tact Switch	CLK ADJ
SW117	PU57551	Tact Switch	CNT RESET
SW118	PU57551	Tact Switch	CNT/LAP
SW119	PU57551	Tact Switch	CLOCK
	PU35358A	Display Holder Ass'y	FDP
	PQ30398	Display Holder	Incl. PU35358A
	PU50626-10	Cushion	Incl. PU35358A (E)
	PU50626-12	Cushion	Incl. PU35358A (EB/EG)
	PU56692	LED Shade	D112 (E)
	PU56692	LED Shade	D110—112 (EB/EG)
	PU56940-2	LED Holder	D112 (E)
	PU56940-2	LED Holder	D110—112 (EB/EG)
	PU57442-1-1	Spacer	FDP

6.2.9 Timer board assembly [09] PU11074A2-3

Symbol No.	Part No.	Part Name	Description
⚠ IC1	UPD7519H-018-36	Integrated Circuit	
IC2	TL066CP	Integrated Circuit	
IC3	—	—	
IC4	MN1219	Integrated Circuit	
IC5	LM339N	Integrated Circuit	or UPC339C
Q1	DTC114YF	D Transistor	
Q2	DTC124F	D Transistor	
⚠ Q3	2SD638R,S	Transistor	
Q4	TN41A	PUT	Programmable Unijunction Transistor
D1	MA167	Diode	
D2	MA167	Diode	
D3	MA167	Diode	
D8	1SS133	Diode	
D9	1SS133	Diode	
D10	LTZ-R15	LED	
D11	—	—	
D12	1SS133	Diode	
D20	1SS133	Diode	
D21	1SS133	Diode	
⚠ D22	MA27WA	Diode	
⚠ D23	HZ6A1L	Zener Diode	
⚠ R1	QRD161J-561	CR	
R2	QRD161J-151	CR	
R3	—	—	
R4	QRD161J-103	CR	
R5	QRD161J-103	CR	
R6	QRD161J-103	CR	
R7	QRD161J-104	CR	
R8	—	—	
R9	QRD161J-103	CR	
R10	QRD161J-103	CR	
R11	QRD161J-103	CR	
R12	QRD161J-103	CR	
R13	—	—	
R14	QRD161J-103	CR	
R15	QRD161J-103	CR	
R16	QRD161J-103	CR	
R17	QRD161J-103	CR	
R18	QRD161J-103	CR	
R19	QRD161J-103	CR	
R20	QRD161J-103	CR	
R21	QRD161J-103	CR	
R22	QRD161J-273	CR	
R23	QRD161J-472	CR	

Symbol No.	Part No.	Part Name	Description
R30	QRD161J-104	CR	
R31	QRD161J-393	CR	
R32	QRD161J-473	CR	
R40	QRD161J-473	CR	
R41	QRD161J-224	CR	
R42	QRD161J-684	CR	
R43	QRD161J-474	CR	
R44	QRD161J-333	CR	
R45	QRD161J-564	CR	
R46	QRD161J-224	CR	
R50	QRD161J-103	CR	
R51	QRD161J-102	CR	
R52	QRD161J-102	CR	
R53	QRD161J-102	CR	
R54	QRD161J-102	CR	
R60	QRD161J-222	CR	
R61	QRD161J-222	CR	
R62	QRD161J-222	CR	
R63	QRD161J-222	CR	
R70	QRD161J-474	CR	
R71	QRD161J-274	CR	
R72	QRD161J-272	CR	
R73	QRD161J-562	CR	
R74	QRD161J-222	CR	
R75	QRD161J-105	CR	
R76	QRD161J-105	CR	
R77	QRD161J-683	CR	
R78	QRD161J-123	CR	
R79	QRD161J-393	CR	
R80	QRD161J-333	CR	
R81	QRD161J-223	CR	
R82	QRD161J-105	CR	
R83	QRD161J-105	CR	
R84	QRD161J-224	CR	
⚠ R90	PU52108-100	Posistor	10 Ω
⚠ R91	PU52108-100	Posistor	10 Ω
RA1	EXB-P84104M	Resistor Array	or RGLD4X104M
RA2	—	—	
RA3	EXB-P86103M	Resistor Arrary	or RGLD6X103M
C1	QCF31HP-223	C Cap	
C2	QCF31HP-223	C Cap	
C3	QET61CM-336	E Cap	
C4	QET61VM-336	E Cap	
C5	QET61HM-225	E Cap	
C6	QET60JM-107	E Cap	
C7	QET60JM-107	E Cap	

Symbol No.	Part No.	Part Name	Description
C11	QAT3001-011	TR Cap	18 pF
C12	QCS31HJ-5R0	C Cap	
C13	QCS31HJ-180	C Cap	
C14	QCF31HP-223	C Cap	
C15	QCF31HP-223	C Cap	
C16	—	—	
C17	QCF31HP-223	C Cap	
C18	QET61HM-225	E Cap	
C19	—	—	
C20	QET61HM-474	E Cap	
C21	QET61HM-105	E Cap	
C22	QET61HM-475	E Cap	
C30	PU52749-474	E Cap	Back-up Cap 0.47 F/5.5 V
L1	PU48530-101K	Peaking Coil	100 μH
⚠ X1	PU47695-2	Crystal	4.19 MHz
SW1	PU57550	Tack Switch	STORE
SW2	PU57550	Tact Switch	SKIP
SW3	PU57550	Tact Switch	CH SET
SW4	PU57550	Tact Switch	U
SW5	PU57550	Tact Switch	III
SW6	PU57550	Tact Switch	I
SW7	PU57550	Tact Switch	MANUAL +
SW8	PU57550	Tact Switch	MANUAL —
SW9	PU52621	Push Switch	AFC
CN1	PU49215-3	Cap Housing	
CN2	PU43351-2	Cap Housing	
CN3	PU43351-2	Cap Housing	
CN4	PU49215-9	Cap Housing	
CN5	PU49215-8	Cap Housing	
CN6	PU49215-6	Cap Housing	
	PU45908-2	Test Pin	TP1—4
	PQ30194-3-4	CH Set Buttons	
	PQ41268	Button	

6.2.10 (a) Terminal board assembly [10]
..... PU21968A-1 (E)

Symbol No.	Part No.	Part Name	Description
D1	MA150	Diode	
D2	MA150	Diode	
D3	MA161	Diode	
R1	QRD181J-750	CR	
R2	QRD181J-221	CR	
R3	QRD181J-563	CR	
R4	QRD181J-563	CR	
R5	QRD181J-122	CR	
R6	QRD181J-122	CR	
R7	QRD181J-122	CR	
R8	QRD181J-122	CR	
R9	QRD181J-683	CR	
R10	QRD181J-683	CR	
R11	QRD181J-103	CR	
RY1	PU55260	Relay	
RY2	PU55259	Relay	
SW1	PU56548-2	Slide Switch	VIDEO MODE
	PU57384	Jack Assembly	

6.2.10 (b) Terminal board assembly [10]
..... PU21969A-1 (EB/EG)

Symbol No.	Part No.	Part Name	Description
D1	1SS133	Diode	
R1	QRD161J-123	CR	
R2	QRD161J-272	CR	
R3	QRD161J-393	CR	
R4	QRD161J-123	CR	
R5	QRD161J-393	CR	
R6	QRD161J-272	CR	
R7	QRD161J-563	CR	
R8	QRD161J-563	CR	
R9	QRD161J-122	CR	
R10	QRD161J-122	CR	
R11	QRD161J-122	CR	
R12	QRD161J-122	CR	
R13	QRD161J-221	CR	
R14	–	–	
R15	–	–	
R16	QRD161J-750	CR	
R17	–	–	
R18	QRD161J-103	CR	
SW1	PU56548-2	Slide Switch	VIDEO MODE
	PU57446	Jack Assembly	

6.2.11 Mix booster board assembly [11]
..... PU21895F2 (E)
PU21895D2 (EB/EG)

Symbol No.	Part No.	Part Name	Description
⚠ MB1	PU55092S	Mix Booster	
CN3	PU49215-2	Cap Housing	

6.2.12 Audio/CTL head board [12]

Symbol No.	Part No.	Part Name	Description
	PU56638	A/CTL Head PWB	
R1	QRD167J-100	CR	
R2	QRD167J-100	CR	
CN1	PU49215-6	Cap Housing	

6.2.13 End sensor board [13]

Symbol No.	Part No.	Part Name	Description
	PU55111	End SENS PWB	
Q1	PT-352V	Photo Transistor	or PN202SR

6.2.14 Loading sensor board [14]

Symbol No.	Part No.	Part Name	Description
	PU56455	Loading SENS PWB	
Q1	PU55827	Photo Sensor	
R1	QRD162J-391	CR	

6.2.15 LED board [15]

Symbol No.	Part No.	Part Name	Description
	PU55826-1-2	LED PWB	
D1	GL-450V	LED	INFRARED

6.2.16 Preamp board assembly [16] PU35243A-2

Symbol No.	Part No.	Part Name	Description
IC1	HA11782	Integrated Circuit	
Q1	2SC2712Y	Chip Transistor	
Q2	2SC2712Y	Chip Transistor	
Q3	2SC2712Y	Chip Transistor	
Q4	2SC2712Y	Chip Transistor	
Q5	2SC2712Y	Chip Transistor	
Q6	2SC2712Y	Chip Transistor	
Q7	2SC2712Y	Chip Transistor	
Q8	2SC2712Y	Chip Transistor	
Q9	2SD602R	Chip Transistor	
D1	1SS133	Diode	
R1	QRS188J-122YN	Chip R	
R2	QRS188J-122YN	Chip R	
R3	QRS188J-3R9YN	Chip R	
R4	QRS188J-3R9YN	Chip R	
R5	QRS188J-390YN	Chip R	
R6	QRS188J-390YN	Chip R	
R7	QRS188J-222YN	Chip R	
R8	QRS188J-222YN	Chip R	
R9	QRS188J-100YN	Chip R	
R10	QRS188J-100YN	Chip R	
R11	QRS188J-562YN	Chip R	
R12	QRS188J-122YN	Chip R	
R13	QRS188J-122YN	Chip R	
R14	QRS188J-331YN	Chip R	
R15	QVZ3531-472	VR	LP CH2 Q
R16	QVZ3514-472	VR	LP CH1 Q
R17	QRS188J-331YN	Chip R	
R18	QRS188J-122YN	Chip R	
R19	QRS188J-122YN	Chip R	
R20	QRS188J-331YN	Chip R	
R21	QVZ3531-472	VR	SP CH2 Q
R22	QVZ3514-472	VR	SP CH1 Q
R23	QRS188J-331YN	Chip R	
R24	QRS188J-183YN	Chip R	
R25	QRS188J-183YN	Chip R	
R26	QRS188J-271YN	Chip R	
R27	QRS188J-271YN	Chip R	
R28	QRS188J-333YN	Chip R	
R29	–	–	
R30	QRS188J-221YN	Chip R	
R31	QRS188J-221YN	Chip R	
	QRS188J-0R0Y	Chip R	B1–B8
C1	QEK41HM-105	E Cap	
C2	QEK41HM-105	E Cap	
C3	QCY81EK-223ZL	Chip Cap	
C4	QCY81EK-223ZL	Chip Cap	
C5	QCY81EK-223ZL	Chip Cap	
C6	QCY81EK-223ZL	Chip Cap	
C7	PU57275-600	TR Cap	60 pF LP CH2 fo
C8	QCY81EK-223ZL	Chip Cap	
C9	QCY81EK-223ZL	Chip Cap	
C10	PU57275-600	TR Cap	60 pF LP CH1 fo
C12	QCS81HJ-120ZL	Chip Cap	
C13	QCY81EK-223ZL	Chip Cap	
C14	PU57275-600	TR Cap	60 pF SP CH2 fo
C15	QCY81EK-223ZL	Chip Cap	
C16	QCY81EK-223ZL	Chip Cap	
C17	PU57275-600	TR Cap	60 pF SP CH1 fo
C18	–	–	
C19	QCS81HJ-150ZL	Chip Cap	
C20	QCY81EK-223ZL	Chip Cap	
C21	QCY81EK-223ZL	Chip Cap	
C22	QCY81EK-223ZL	Chip Cap	
C23	QCY81EK-223ZL	Chip Cap	
C24	QCY81EK-223ZL	Chip Cap	
C25	QCY81EK-223ZL	Chip Cap	
C26	QCY81EK-223ZL	Chip Cap	
C27	QCY81EK-223ZL	Chip Cap	
C28	QER40JM-476	E Cap	
C29	QEK40JM-476	E Cap	
C30	QCY81EK-223ZL	Chip Cap	
C31	QCY81EK-223ZL	Chip Cap	
C32	–	–	
C33	QCY81EK-223ZL	Chip Cap	
C37	QCS81HJ-561ZL	Chip Cap	
C38	QCS81HJ-561ZL	Chip Cap	
L1	PU48530-101K	Peaking Coil	100 μH
L2	PU48530-101K	Peaking Coil	100 μH
L3	PU48530-101K	Peaking Coil	100 μH
RY1	PU56431	Relay	
CN1	PU49215-10	Cap Housing	
	PU45908-2	Test Pin	TP1,2
	PQ41143-1-1	Shield Case	Board Ass'y

6.2.17 Full erase head board [17]

Symbol No.	Part No.	Part Name	Description
	PU55308	Head Board	
CN1	PU43351-102	Cap Housing	

6.2.18 Cassette housing board [18]

Symbol No.	Part No.	Part Name	Description
	PU56460-1-2	CASS Housing PWB	
Q1	PT-352V	Photo Transistor	or PN202SR Start Sensor
C1	QCF11HP-103	C Cap	
C2	QCF11EZ-223	C Cap	
C3	QCF11EZ-223	C Cap	
C4	QCF11HP-103	C Cap	
CN	PU49215-109	Cap Housing	

6.2.19 Reel sensor (SUP) assembly [21] ... PUS36685A

Symbol No.	Part No.	Part Name	Description
	PU55823	Sensor PWB	
	PU55830	Hall Element	
	PQ40298	Sensor Holder	

6.2.20 Reel sensor (TU) assembly [22] PUS36686C

Symbol No.	Part No.	Part Name	Description
	PU55824	Sensor PWB	
	PU55830	Hall Element	
	PQ40296	Sensor Holder	

6.2.21 Drum motor conn. board assembly [23] PU34472A-10

Symbol No.	Part No.	Part Name	Description
	PU21738-1-9	Drum Motor PWB	
CN1	PU49215-114	Cap Housing	
CN2	PU49215-102	Cap Housing	

NOTE: "x2" indicates two pieces.

6.2.22 Demodulator board assembly [24] ..... PU21345F (EB/EG)

Symbol No.	Part No.	Part Name	Description
IC801	LA7506	Integrated Circuit	
IC802	UPC1391H	Integrated Circuit	
IC803	UPC1391H	Integrated Circuit	
IC804	UPC4558C	Integrated Circuit	
IC805	LA7751	Integrated Circuit	
IC806	PU52779	Active Filter	
IC807	UPC358C	Integrated Circuit	
IC808	TA7324P	Integrated Circuit	
Q801	2SC2188	Transistor	
Q802	2SD636R,S	Transistor	
Q803	2SD636R,S	Transistor	
Q804	2SD636R,S	Transistor	
D801	1SS133	Diode	
D802	1SS133	Diode	
D803	MA150	Diode	
D804	MA150	Diode	
D805	1SS133	Diode	
D806	1SS133	Diode	
D807	1SS133	Diode	
D808	1SS133	Diode	
D809	1SS133	Diode	
D810	–	–	
D811	1SS133	Diode	
D812	1SS133	Diode	
R801	QRD161J-750	CR	
R802	QRD161J-102	CR	
R803	–	–	
R804	QRD161J-270	CR	
R805	–	–	
R806	QRD161J-821	CR	
R807	QRD161J-821	CR	
R808	QRD161J-331	CR	
R809	QRD161J-471	CR	
R810	QRD161J-472	CR	
R811	QRD161J-222	CR	
R812	QRD161J-271	CR	
R813	QRD161J-391	CR	
⚠ R814	QRZ0052-100	FR	10 Ω/0.25 W
R815	QVZ3511-473	VR	CH1(MAIN) LEVEL
R816	QRD187J-103	CR	
R817	QRD161J-331	CR	
R818	QRD161J-471	CR	
R819	QRD161J-271	CR	
R820	QRD161J-391	CR	
⚠ R821	QRZ0052-100	FR	10 Ω/0.25 W
R822	QRD161J-182	CR	
R823	QVZ3511-332	VR	CH2(SUB) DEEMP
R824	QRD161J-153	CR	
R825	QRD161J-103	CR	
R826	QRD161J-103	CR	
R827	QRD161J-333	CR	
R828	QRD187J-123	CR	
R829	QRD187J-123	CR	

Symbol No.	Part No.	Part Name	Description
R830	QRD161J-332	CR	
R831	QRD161J-123	CR	
R832	QRD161J-123	CR	
R833	QRD161J-473	CR	
R834	QRD161J-103	CR	
R835	QRD161J-333	CR	
R836	QVZ3511-473	VR	SEPARATION
R837	QRD161J-271	CR	
R838	QVZ3506-223	VR	PILOT CARR
⚠ R839	PU52108-680V	Posistor	68 Ω/0.25 W
⚠ R840	QRZ0052-100	FR	10 Ω/0.25 W
R841	QRD161J-102	CR	
R842	QRD161J-273	CR	
R843	QRD161J-274	CR	
R844	QRD161J-273	CR	
R845	QRD161J-332	CR	
R846	QRD161J-103	CR	
R847	QRD161J-274	CR	
R848	QRD161J-155	CR	
R849	QRD161J-102	CR	
R850	QRD161J-155	CR	
R851	QRD161J-102	CR	
R852	QVZ3506-222	VR	SUB (R) LEVEL
R853	QVZ3506-222	VR	MAIN(L) LEVEL
R854	QRD161J-122	CR	
R855	QRD161J-223	CR	
R856	QRD161J-224	CR	
R857	QRD144J-681	CR	
R858	QRD161J-682	CR	
R859	QRD161J-333	CR	
R860	–	–	
R861	QRD161J-333	CR	
R862	QRD144J-681	CR	
R863	QRD161J-222	CR	
R864	QRD161J-222	CR	
R865	QRD161J-154	CR	
R866	QRD161J-103	CR	
R867	QRD161J-103	CR	
⚠ R868	PU52108-470V	Posistor	47 Ω/0.25 W
R869	–	–	
R870	–	–	
R871	QRD167J-822	CR	
C801	QCF31HP-222	C Cap	
C802	QCY31HK-222	E Cap	
C803	QCF31HP-222	C Cap	
C804	QCF31HP-472	C Cap	
C805	QCF31HP-103	C Cap	
C806	QFN31HK-472	MY Cap	
C807	QCY41HK-103	C Cap	
C808	–	–	
C809	QET61CM-107	E Cap	
C810	–	–	
C811	QCF31HP-223	C Cap	
C812	QCF31HP-223	C Cap	
C813	QCS31HJ-220	C Cap	
C814	QET61CM-336	E Cap	
C815	QCF31HP-223	C Cap	
C816	QFN31HK-223	MY Cap	

Symbol No.	Part No.	Part Name	Description
C817	QEN61CM-106	E Cap	
C818	QCF31HP-223	C Cap	
C819	QCF31HP-223	C Cap	
C820	QCS31HJ-220	C Cap	
C821	QET61CM-336	E Cap	
C822	QCF31HP-223	C Cap	
C823	QFN31HK-223	MY Cap	
C824	QET61CM-106	E Cap	
C825	QEN61CM-106	E Cap	
C826	QET61CM-106	E Cap	
C827	QET61CM-476	E Cap	
C828	QET61CM-476	E Cap	
C829	QET61HM-105	E Cap	
C830	–	–	
C831	QET61CM-106	E Cap	
C832	QET61HM-105	E Cap	
C833	QET61CM-106	E Cap	
C834	QET61CM-106	E Cap	
C835	QET61CM-106	E Cap	
C836	QET61CM-106	E Cap	
C837	QCS31HJ-271	C Cap	
C838	QCF31HP-223	C Cap	
C839	QET61CM-477	E Cap	
C840	–	–	
C841	QET61HM-474	E Cap	
C842	QET61HM-105	E Cap	
C843	QET61CM-476	E Cap	
C844	QET61CM-106	E Cap	
C845	QET61CM-106	E Cap	
C846	QET61CM-106	E Cap	
C847	QET61CM-106	E Cap	
C848	QET61CM-226	E Cap	
C849	QCY31HK-102	C Cap	
C850	QCF31HP-103	C Cap	
C851	QEE41EM-105	T Cap	
C852	QET61CM-476	E Cap	
C853	QET61CM-476	E Cap	
C854	QET61CM-336	E Cap	
C855	QET61CM-336	E Cap	
C856	QET61CM-227	E Cap	
C857	QCF31HP-223	C Cap	
C858	QET61HM-474	E Cap	
C859	QET41CM-108	E Cap	
C860	–	–	
C861	QCF31HP-472	C Cap	
C862	QCF11HP-222	C Cap	
C863	QCF11HP-222	C Cap	
C864	QCF11HP-102	C Cap	
L801	PU49994-R47	Peaking Coil	0.47 μH
⚠ L802	PU48530-100K	Peaking Coil	10 μH
CF801	PU49295	C Filter	5.5 MHz
CF802	PU49295-2	C Filter	5.5 MHz
CF803	PU32991-2	C Filter	5.5 MHz
CF804	PU52775	C Filter	5.74 MHz
CF805	PU52775-2	C Filter	5.74 MHz
CF806	PU32991-4	C Filter	5.74 MHz

(Demodulator)

Symbol No.	Part No.	Part Name	Description
T801	PU52776	I F T	38.9 MHz MATCHING
T802	PU52777	I F T	38.9 MHz LLD ADJ
T803	PU52778	I F T	54.7 kHz PILOT CARR
⚠ T804	PU52129	Coil	54.7 kHz PILOT TANK
SAW801	PU32987-7	SAW Filter	
CN1	–	–	
CN2	PU43351-2	Cap Housing	21–22
CN3	PU43351-4	Cap Housing	31–34
CN4	PU43351-4Y	Cap Housing	41–44
CN5	PU43351-2Y	Cap Housing	51–52
CN6	PU43351-3	Cap Housing	11–13
J801	QMC0131-002	Jack Assembly	
	PU45908-3	Test Pin	TP803–809, 811–813, 815–819, 821
	PU53152-1-2	Shield Case	
	PU53153-1-2	Shield Cover	
	PU53154-1-2	Shield Plate	

6.2.23 Drum FG board [27]

Symbol No.	Part No.	Part Name	Description
	PU21739	Drum FG Board	
	SPSH1722Z	Mini Screw	x 2

NOTE: "x2" indicates two pieces.

6.2.24 Mode CTL motor board [30]

Symbol No.	Part No.	Part Name	Description
	PU56609-1-1	Motor Board	
C1	QEN61HM-105	NP Cap	
C2	QCF11HP-223	C Cap	
C3	QCF11HP-223	C Cap	
CN1	PU49215-103	Cap Housing	

6.2.25 Remote control board assembly [40]

..... PU11099-001

Symbol No.	Part No.	Part Name	Description
⚠ IC1	M50115AP	Integrated Circuit	
⚠ Q1	2SD636Q,R,S	Transistor	
⚠ Q2	2SD636Q,R,S	Transistor	
⚠ Q3	2SB822Q,R	Transistor	
D1	MA154WA	Diode	
D2	MA154WA	Diode	
D3	MA154WA	Diode	
D4	MA154WA	Diode	
D5	MA154WA	Diode	
D6	MA154WA	Diode	
D7	MA154WA	Diode	
D8	MA154WA	Diode	
D9	MA154WA	Diode	
D10	MA154WA	Diode	
D11	MA154WA	Diode	
D12	MA154WA	Diode	
D13	SE303A	LED	INFRARED
D14	SR538D	LED	INDICATOR
D15	SE303A	LED	INFRARED
R1	QRD181J-104	CR	
R2	QRD181J-474	CR	
R3	QRD181J-222	CR	
R4	QRD181J-470	CR	
R5	QRD181J-471	CR	
R6	QRD181J-180	CR	
R7	QRD181J-1R2	CR	
R8	QRD181J-1R2	CR	
C1	QCF11HP-101	C Cap	
C2	QCF11HP-101	C Cap	
C3	QET40JM-101	E Cap	
X1	CSB455EB	Ceramic Filter	
	PU11099-004	Electrode Plate (B)	x2
	PU10882	PC Joiner	
	PU10882-009	Cushion	

NOTE: "x2" indicates two pieces.

E. & O. E. No. 8364

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